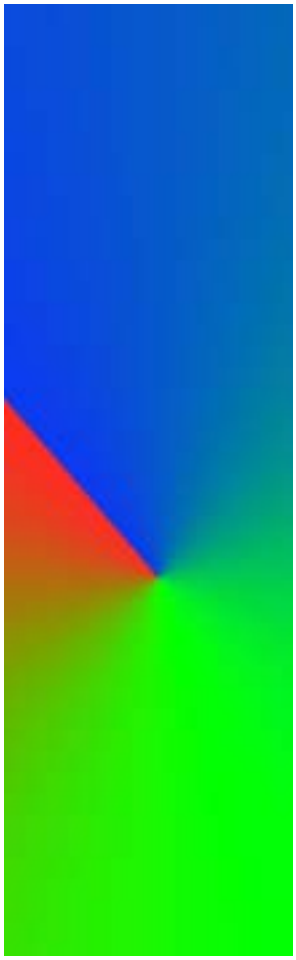
Quadra

User's Guide



SPECTRUM

DOCUMENT

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1 INTRODUCTION

PRODUCT OVERVIEW

The *Quadra* is a high performance, four channel multi-format up/down converter with a full range of digital and analog input and outputs. The unit provides four independent processing channels, each with the ability to select between three standard inputs and one optional input. The following sources can be used as inputs for each channel:

- RGB / YP_bP_r component
- Composite video
- S-Video
- DVI (optional)

When using DVI inputs and outputs, the *Quadra* offers a completely digital path from signal source to display. Typically, *Quadra* is used as an advanced, image "gearbox," with the ability to convert each input to a different user-defined output format.

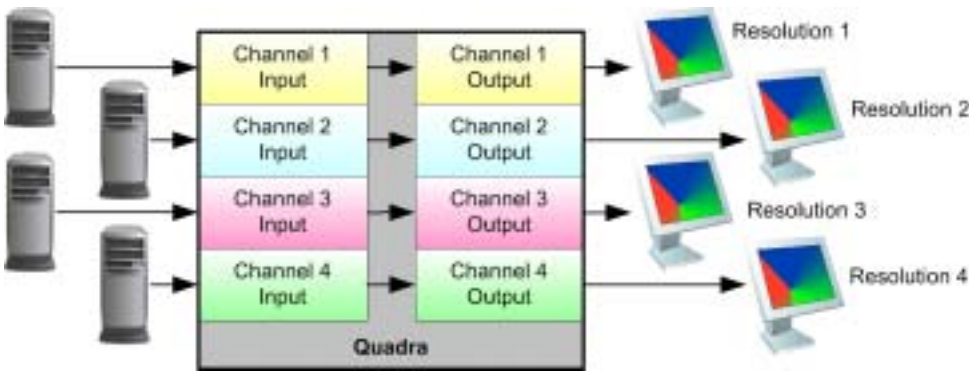


Figure 1-1. Four channel conversion application

All output signal parameters are user-selectable, including line rate, frame rate, interlacing, blanking and sync type.

Additionally, *Quadra*'s pan and zoom functions enable you to selectively extract any portion of an input signal for cropping or aspect ratio adjustment. Conversion to a lower line rate format can be accomplished by extracting a portion of the original signal, by down-converting the entire raster or by a combination of both methods.

A command line interface provides easy access to all *Quadra* functions. This interface is supported remotely by either RS-232 serial communications or by network control (Ethernet 10/100 BaseT).

IN THIS GUIDE

The following chapters are included in the *Quadra* User's Guide:

- Chapter 1, "**Introduction**" outlines the guide, describes *Quadra*'s system features, and discusses inputs, outputs and scan rates.
- Chapter 2, "**Installation and Setup**" discusses system components, provides front and rear panel diagrams, and provides instructions for system installation, communications setup and timing.
- Chapter 3, "**Operations**" provides operating instructions for a variety of frequently-used *Quadra* features.
- Chapter 4, "**Command Line Interface**" discusses command format and syntax, and provides comprehensive tables of all control commands — arranged according to category.
- Appendix A, "**Image Concepts**" discusses the basics of image size, position and aspect ration, along with the important concepts of source and destination rectangles.
- Appendix B, "**Communications Setup**" provides information about specific communications setup procedures such as IP addresses.
- Appendix C, "**Connector Types**" provides technical information about *Quadra*'s signal and control connectors.
- Appendix D, "**Firmware Upgrades and Troubleshooting**" provides instructions for updating the system firmware, along with several system troubleshooting procedures.
- Appendix E, "**Technical Specifications**" provides system technical specifications plus information on data storage parameters.

SYSTEM FEATURES

The *Quadra* includes the following standard features and functions:

- **Flexible input channels** — As standard, each input channel accepts NTSC/PAL composite, S-Video, YP_bP_r component (HDTV) or high-resolution RGB signals. Optionally, a digital input module (DVI format) is available for each channel. Full 24-bit color processing is used throughout the system.

Note

HDTV (High Definition Television) input signals can be processed through a channel's RGB/YP_bP_r connector.

- **Image Manipulation** — Any portion of an input image can be extracted and expanded to fill the output raster. Image characteristics such as brightness, saturation and gamma can be adjusted. The system also enables you to zoom, pan and freeze an input source, and if the size of the output image is reduced, the background can be black, a solid color, or a shaded color.
- **Remote control** — Using a command line interface, complete system control is supported via the RS-232 serial port or the 10/100 BaseT Ethernet port. Many control parameters can be stored in non-volatile memory for later use.
- **High-resolution output** — The format for each channel's high-resolution RGB and DVI outputs is independently adjustable (up to 1600 x 1200 pixels). Each output channel can be set to a different resolution, depending upon your application requirements.
- **Auto sync** — *Quadra* automatically detects and locks to *all* computer sync signals. Industry standard and custom video timings are supported.

A WORD ABOUT INPUTS

Each *Quadra* input channel accepts any one of the component, composite, RGB and (optionally) digital inputs. Using control commands, users can dynamically *switch* between any one of the input sources, but the limit of one source per channel remains in effect.

For example, you could connect **RGB** from a PC, **S-Video** from a camera and **Composite** video from a VHS tape deck — all to input 1's input connectors, and then switch between them using control commands.

Please note the following important points regarding inputs:

- Video inputs can originate from devices such as TV cameras, video cassette recorders, DVD players or video teleconferencing systems.
- Analog RGB inputs typically originate from a computer. These inputs can be interlaced or non-interlaced, up to 1600 x 1200 pixel resolution, and refresh rates (or frame rates) up to 200 Hz.
- The system's computer inputs can be configured with any sync format (sync on green, composite sync, or separate H- and V-drive).
- Because the Component and RGB input signals use the same 15-pin "D" input connector, you can not connect both RGB and component inputs to a given channel simultaneously.

The figure below illustrates a block diagram of the *Quadra*, showing the four

identical input and output channels.

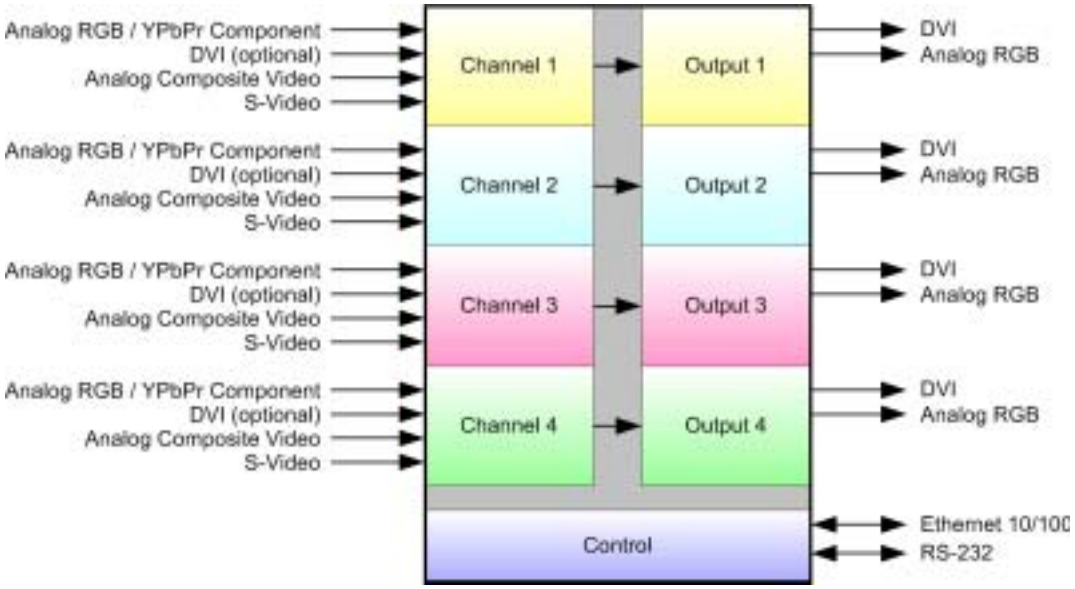


Figure 1-2. *Quadra* **block diagram**

A WORD ABOUT OUTPUTS

As standard, *Quadra* provides four identical DVI-I output connectors — one per output channel. Each output connector is dedicated to a specific input channel, and each output connector supports one analog or one digital output.

Each channel's input signals are converted to that channel's selected output resolution (adjustable up to 1600 pixels by 1200 lines), with horizontal scan rates ranging from 12 to 125 kHz.

Note For a selected output channel, both the analog and digital outputs can be used simultaneously, however, only one output resolution can be set.

A WORD ABOUT SCAN RATES

Quadra specifications state that a channel's output resolution is adjustable up to 1600 pixels by 1200 lines, and horizontal scan rates are adjustable from 15 to 125 kHz. However, users should be aware that there are several important constraints to system resolution, including:

- Maximum pixel clock (also known as "sample rate")
- Maximum number of pixels that can be processed

- Maximum number of lines that can be processed

These factors are all *interrelated* with the system's refresh rate (also known as "frame rate"). When configuring a channel's output, please keep the following rules of thumb in mind:

- Sample rate is directly proportional to the product of:

  (# of pixels per line) x (# lines) x (refresh rate)

  Therefore, if a higher refresh rate is desired, the sample rate must be increased. For example:

  ~ A 1600 x 1200 output @ 60 Hz refresh rate requires a pixel clock of 162 MHz — which is equal to *Quadra*'s maximum pixel clock of 162 MHz.

  ~ A 1600 x 1200 output @ 65 Hz refresh rate requires a pixel clock of 175 MHz — which is greater than the maximum of 162 MHz.

- A higher refresh rate can also be achieved by reducing either the # of pixels per line or the # of lines per frame.

Note

The ratio of active pixels per line to the number of active lines is the aspect ratio, typically 4:3 or 16:9.

For example:

~ A 1600 x 1200 output @ 85 Hz refresh rate requires a pixel clock of 229.5 MHz — which is greater than the maximum pixel clock of 162 MHz.

~ A 1280 x 960 output @ 85 Hz refresh rate requires a pixel clock of 148.5 MHz — which is less than the *Quadra* maximum pixel clock of 162 MHz.

When configuring your system, the important factor to remember is the *interrelation* between specifications:

- **Yes** — you can adjust your system's output resolution up to 1600 pixels by 1200 lines.
- **Yes** — you can adjust the system's output horizontal scan rate from 12 to 125 kHz.
- **No** — you can not configure resolution at 1600 x 1200 with a refresh rate of 100 Hz — because of the inherent interrelation between factors.

QUADRA CONTROL

Using a command line interface, system control is provided via the RS-232 serial port or the 10/100 BaseT Ethernet port. There are no controls on the *Quadra* chassis.

- The **RS-232** serial port connects to an ASCII terminal, any computer with a serial port or an external device such as a touchpad. Commands are sent from the terminal or computer to the *Quadra*.
- The **Ethernet** port (10/100BaseT) allows a *Quadra* system to be connected to a local area network (LAN) or directly to a PC that is properly equipped with a network card. Note that direct connection requires the use of an Ethernet hub or Ethernet cross-over cable.

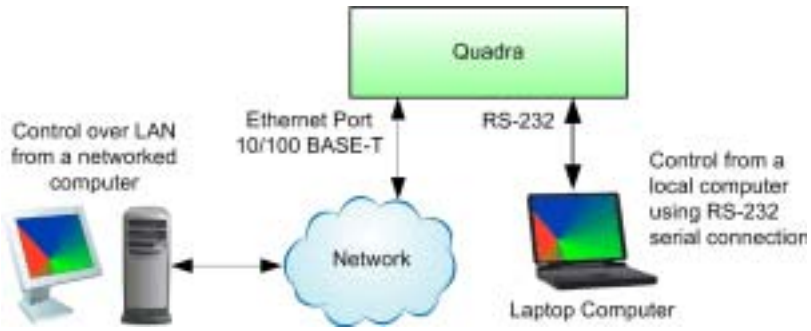


Figure 1-3. *Quadra* **control alternatives**

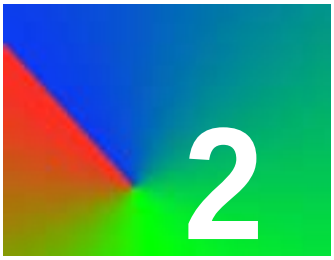
FEATURE SUMMARY

Following is a concise summary of *Quadra* features:

- System:
  - ~ Converts four RGB/video inputs simultaneously, each to its own output channel.
  - ~ Each output channel can be set to a different resolution.
  - ~ Full 24-bit color processing is used throughout.
  - ~ System control is a command line interface, provided via serial RS-232 or 10/100 BASE-T Ethernet.
  - ~ Compact 1RU package.
- Inputs:
  - ~ Supports a wide range of analog RGB inputs with resolutions up to 1600 x 1200 @ 60 Hz frame rate.
  - ~ Supports HDTV / YP_bP_r input with tri-level sync.
  - ~ Optional DVI inputs up to 1600 x 1200 @ 60Hz.
  - ~ Video inputs are selectable between S-Video and Composite formats, in both NTSC and PAL video standards.
- Outputs:
  - ~ Each channel's output connector supports DVI and analog signals.

- ~ Analog RGB output up to 1600 x 1200 @ 75Hz.
- ~ DVI output up to 1600 x 1200 @ 60Hz.
- ~ Adjustable output gamma to optimize performance with a variety of display technologies.

- Special features:
  - ~ High quality filtering.
  - ~ Pan, zoom and freeze each input.
  - ~ Colored and shaded backgrounds.
  - ~ Export / import system settings.
  - ~ Support for EDID.
  - ~ Wall mode.



INSTALLATION AND SETUP

IN THIS CHAPTER

This chapter provides instructions for installing and setting up your *Quadra* system. The following topics are discussed:

STANDARD SUPPLIED COMPONENTS

The following equipment is included in the *Quadra* shipping carton:

Table 2-1. Standard Supplied Components

Item	Part Number
Quadra	---
Quadra User Manual (on CD-ROM)	350-7951
Power cord (110 or 220 volt)	520-1188 or 520-0271-1
DVI - VGA Adapter	520-7885

OPTIONAL ITEMS

RGB Spectrum can optionally provide additional equipment that may be useful in installing and operating your *Quadra* system. The items listed below may be purchased separately from RGB Spectrum.

Table 2-2. Optional Items

Item	Part Number	Description
VGA Cable	520-0298-1	15-pin HD Male to 15-pin HD Male, 6 ft. Use to connect your analog output/inputs to sources with a female VGA connector.
VGA-to-BNC Adapter	520-0251-1	15-pin HD Male to a 5 BNC cable bundle Male, 6 ft. 10 inches. Use to connect the analog output/inputs to sources with BNC connectors.

RACK MOUNTING

The *Quadra* chassis is designed to be mounted in a standard 19" rack. Use the following steps to rack mount the chassis:

1. Ensure that the *Quadra* chassis is positioned in the rack such that the side air intake and exhaust vents are not blocked.
2. Using four rack screws (not supplied), rack mount the unit from the front rack ears. Install the *lower* of the two mounting holes first. Rack threads may be metric or otherwise, depending upon the rack type.

Important Do not use the *Quadra* as a shelf to support other pieces of equipment. If you do, the rack ears and mounting screws may be damaged.

3. For additional stability at the rear of the chassis, *Quadra* is provided with a rear rack bracket and extension arm. Attach the rear brackets to the rack adapter at the rear of your chassis.
4. Slide an extension arm through the slot on the rack adapter and attach the arm to the chassis.
5. Attach the arm to the rear bracket by means of the fasteners located in the arms.

FRONT PANEL

The figure below illustrates a front panel view of the *Quadra*.

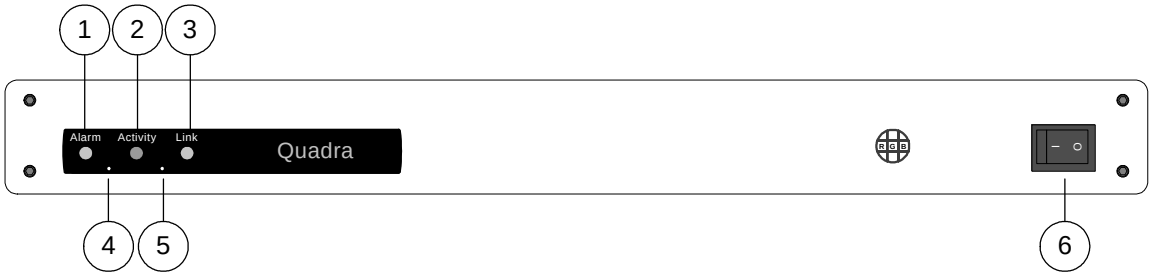


Figure 2-1. *Quadra* **Front Panel View**

1)	**Alarm LED**	3)	**Ethernet Link LED**	5)	**Comms Default Button**
2)	**Ethernet Activity LED**	4)	**Reset Button**	6)	**AC Power Switch**

Descriptions of each control and indicator are provided below:

1) Alarm LED

The **Alarm LED** glows solid amber when the *Quadra*'s internal electronics have exceeded the maximum internal temperature of 60 degrees Celsius. Note that this is a warning only, and users should take corrective action to avoid damage to the unit.

2) Ethernet Activity LED

The **Ethernet Activity LED** blinks green when there is data traffic over the *Quadra*'s Ethernet connection.

3) Ethernet Link LED

The **Ethernet Link LED** glows solid green when there is a valid Ethernet connection between *Quadra* and another Ethernet device. Note that if an RS-232 connection *only* is used, this LED will be off.

4) Reset Button

Press the **Reset Button** to perform a hard reset. Use an unfolded paper clip to press the button, which is located inside the small access hole. When pressed, systems parameters are unchanged (this is equivalent to cycling the power).

5) Comms Default Button

Press the **Communications Default Button** to reset the IP address to the factory default (**192.168.1.200**) and reset the RS-232 serial port to 9600 baud (use and unfolded paper clip to actuate the switch).

6) AC Power Switch

Use the **AC Power Switch** to turn the *Quadra* on and off. When the unit is on, the LED inside the switch glows red.

REAR PANEL

The figure below shows a view of the *Quadra* rear panel.

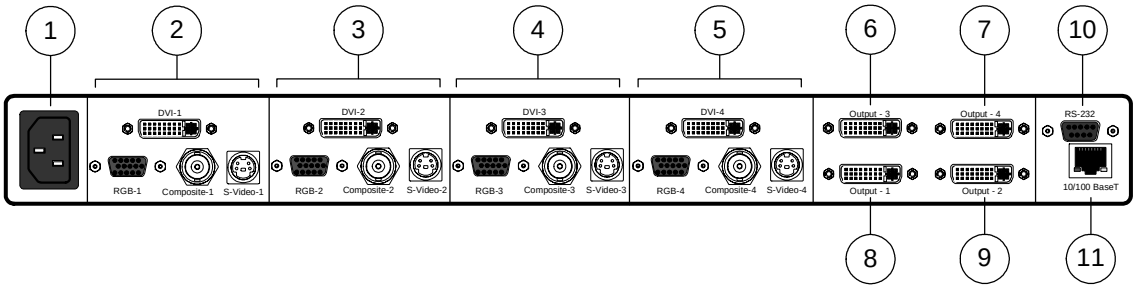


Figure 2-2. *Quadra* **Rear Panel View**

1)	**AC Power Connector**	5)	**Input Channel 4**	9)	**Graphic Output 4**
2)	**Input Channel 1**	6)	**Graphic Output 1**	10)	**RS-232 Serial Port**
3)	**Input Channel 2**	7)	**Graphic Output 2**	11)	**Ethernet Port**
4)	**Input Channel 3**	8)	**Graphic Output 3**		

Descriptions of each section and connector are provided below:

1) AC Power Connector

One **AC Power Connector** (IEC 320 three pin) is provided for the system's universal power supply, which operates from any power source with a line voltage in the range of 100 - 260 VAC.

2) Input Channel 1

Up to four connectors are provided for **Input Channel 1**, as illustrated and described below. This input supports composite, RGB/component, S-Video and (optionally) DVI signals.

Note

Click on a connector below to learn more about the connector's specifications.

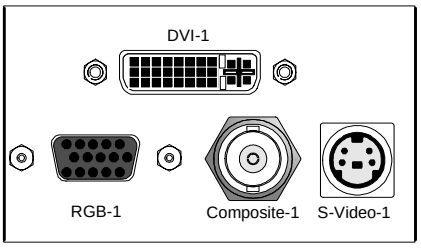


Figure 2-3. Input Channel Connectors

- **Composite Video** — One BNC female connector is provided for NTSC or PAL composite video, a signal that typically originates from a VCR or camera. An adapter may be required when connecting this input to consumer equipment, which typically uses a phono connector for composite video (professional equipment typically uses BNC connectors).
- **S-Video** — One 4-pin mini-DIN connector is provided for NTSC or PAL S-Video, a signal that is typically of higher quality than composite video, and originates from many DVD players and cameras. Note that this connector can alternatively be used to connect a second composite input. In this case, a special cable will be needed to convert from the mini DIN connector to BNC (or phono) connector that is typically used for composite video signals.
- **RGB / YP_bP_r** — One 15-pin female D-sub connector is provided for either high resolution analog RGB input or YP_bP_r component video (HDTV). This input supports 3, 4 or 5-wire connections, and is typically used to connect the output of a computer to *Quadra*.

Note

Typically, a computer's **RGB** format output is connected to *Quadra* on this input. This input may also be used to connect HDTV signals, which can originate in **RGB** or **YP_bP_r** formats.

- **Digital** — One DVI-I connector is used for the optional digital input, typically used to connect an external computer graphics output to the *Quadra*.

3) Input Channel 2

Four connectors are provided for Input Channel 2. The complement of input signal types is identical to Input Channel 1. See the "**Input Channel 1**" description on the previous page for details.

4) Input Channel 3

The complement of input signal types is identical to Input Channel 1.

5) Input Channel 4

The complement of input signal types is identical to Input Channel 1.

Note

The input channels are configured identically. All inputs are self terminating.

6) Graphic Output 1

One DVI-I multi-pin connector is provided for Graphic Output 1, which outputs both analog and DVI signals on the same connector. The analog and digital outputs of each channel provide images with the same resolution. Using the proper cable (customer supplied), you

can connect this output to a DVI-capable monitor or an analog RGB monitor.

7) Graphic Output 2

One DVI-I multi-pin connector is provided for Graphic Output 2, which is identical to Graphic Output 1.

8) Graphic Output 3

One DVI-I multi-pin connector is provided for Graphic Output 3, which is identical to Graphic Output 1.

9) Graphic Output 4

One DVI-I multi-pin connector is provided for Graphic Output 4, which is identical to Graphic Output 1.

10) RS-232 Serial Port

One 9-pin female D-Sub connector is provided for local RS-232 control from an external device. Please note:

- ~ Use this connector when the controlling device is physically close to *Quadra*, and control across a network is not required.
- ~ Connection to a PC, external controller or serial terminal can be made using this connector.

11) Ethernet Port

One 10/100 Base-T Ethernet (RJ-45 connector) is provided for control over a network or from a local computer using peer-to-peer communication. Using a standard Ethernet cable, you can connect directly to a local area network (LAN). Use this port when control over a network is a requirement.

Note

You can control *Quadra* by using either the RS-232 port or the 10/100 Base-T Ethernet port. Both ports can be connected at the same time.

INSTALLATION

This section provides *Quadra* installation instructions. All connections are made to the rear of the *Quadra* chassis. Refer to **Figure 2-2** for the location of each connector.

Note

Ensure that *Quadra* is rack mounted before continuing. Refer to the "**Rack Mounting**" section for instructions.

Use the following steps to install the *Quadra*:

1. **Connect Power** — Connect a power cord to the AC Power Connector. *Quadra* is equipped with a universal, 100-264 V, 50-400 Hz power supply.
2. **Connect Inputs** — Connect the desired video and/or computer sources to input channels 1 through 4. Please note the following points regarding the various input formats:
   - ~ **Composite** input — use a standard BNC cable.
   - ~ **S-video** input — this input can be used to connect S-Video or an additional composite video signal.
     - To connect an S-Video signal, use a standard 4-pin mini-DIN S-Video cable.
     - To connect a composite video signal, use a mini-DIN to BNC adapter, or a mini-DIN to phono adapter cable. Connect the composite video signal to the "Y" channel.
   - ~ **RGB / YP_bP_r** input — use a standard VGA cable with a 15-pin male D-sub connector. This connector supports 3, 4 or 5 wire connections. In Appendix C, refer to the "**High Resolution Analog Connector**" section for pinouts.
   - ~ **Digital** input (optional) — use a standard DVI cable. In Appendix C, refer to the "**DVI-I Connector**" section for pinout information.

   Remember that for each channel, a source can be connected to each input (composite, S-Video, RGB and digital), but only one input can be routed to a channel's output. You can choose which input to process by using the "**INputSouRCe**" command.

   Refer to Chapter 4, "**Command Line Interface**" for a complete description of *Quadra* commands.
3. **Connect Channel Outputs** — Using DVI-I interconnect cables, connect channel outputs 1, 2, 3 and 4 to the desired destination displays. Please note:
   - ~ To connect to a DVI capable monitor, use a standard DVI interconnect cable.

~ To connect to a monitor with an analog RGB input, use an adapter that converts from the DVI connector directly to a 15-pin D-sub connector. This adapter is provided as a standard item with your *Quadra*. As an alternative, standard cables are readily available to convert from the DVI connector to either 15-pin D or BNC connectors.

Remember that each output connector supports both analog and DVI signals. For a selected output channel, both the analog and digital outputs can be used simultaneously, however, only one output resolution can be set.

In Appendix C, refer to the "**DVI-I Connector**" section for detailed wiring instructions for channel output connectors.

Note Analog display devices must be able to accept RGB inputs of at least 15 kHz.

4. **Select a Control Method** — either RS-232 or Ethernet. Both methods use a command line interface:

   ~ **Serial Control** — To control *Quadra* using a terminal emulation program (such as Hyperterminal or Procomm), connect the COM port of your computer (or other terminal control device) to *Quadra*'s RS-232 serial port. A straight through cable (typically 9-pin male to female with one-to-one wiring) will be required.

   In Appendix C, refer to the "**RS-232 Connector**" section for information on RS-232 connection parameters.

   Please continue with the "**System Control Setup**" section.

   ~ **Ethernet Control** — To control *Quadra* over a network, connect an Ethernet cable (from your LAN, Ethernet hub or switch) to *Quadra*'s 10/100 Base-T Ethernet port. This method allows you to use a Telnet session. Ethernet is also ideal for controlling *multiple Quadra* units from a single control point.

Note A PC can be connected *directly* to the *Quadra*'s Ethernet port, without being connected to a network. For this "peer-to-peer" method, an Ethernet crossover cable is required. In Appendix C, refer to the "**Ethernet Connector**" section for pinout details.

Please continue with the "**System Control Setup**" section.

SYSTEM CONTROL SETUP

The following topics are discussed in this section:

- **Methods of Communications**
- **RS-232 Serial Control Setup**
- **Ethernet Control Setup**

Note

Before applying power, ensure that all cables are connected correctly and that *Quadra*'s power switch is **OFF**. With all cables properly connected, turn the *Quadra* **ON**.

METHODS OF COMMUNICATIONS

The control setup procedure consists of configuring an external device to communicate with the *Quadra*. This can be accomplished using one of two control methods:

- **RS-232 Control** — This method uses a command line interface to control *Quadra* through a terminal emulation program. Refer to the following "**RS-232 Serial Control Setup**" section for instructions.
- **Ethernet Control** — Using an Ethernet connection between *Quadra* and your PC, this method uses a Telnet session for all system control functions. Operationally, the Telnet command-line interface is almost identical to RS-232 control, but the setup procedure is different. Refer to the "**Ethernet Control Setup**" section for instructions.

Note

Telnet is a command protocol used over Ethernet.

Once the communications have been established using one of the above methods, you will be able to adjust all *Quadra* system parameters.

Refer to Chapter 4, "**Command Line Interface**" for a complete description of all *Quadra* commands.

RS-232 SERIAL CONTROL SETUP

The RS-232 serial control method uses an ASCII terminal or a PC running a terminal emulation program (such as HyperTerminal or Procomm) to communicate with *Quadra*.

Use the following steps to control *Quadra* via RS-232:

1. Ensure that *Quadra*'s RS-232 Serial Port is connected to the COM port of your computer (or other terminal control device), as outlined in the "**Installation**" section.
2. On your PC, launch Hyperterminal. If you need instructions, refer to the "**Launching a Hyperterminal Window**" section in Appendix B.
3. In the **COM Properties Dialog**, configure your PC to match *Quadra*'s pre-configured factory settings, as follows:
   - ~ Bits per second (baud): **9600**

- ~ Data bits: **8**
- ~ Parity: **None**
- ~ Stop bits: **1**
- ~ Flow control: **XOn / XOff**

Quadra can be configured to operate at baud rates from 9600 baud to 115 kbaud. In Chapter 4, refer to the "**Serial Port Commands**" section for details about changing baud rates.

4. Click **OK** to display the Hyperterminal window.
5. Select the "phone" icon to connect the PC to the *Quadra*.
6. When the window is open, press **ENTER**.

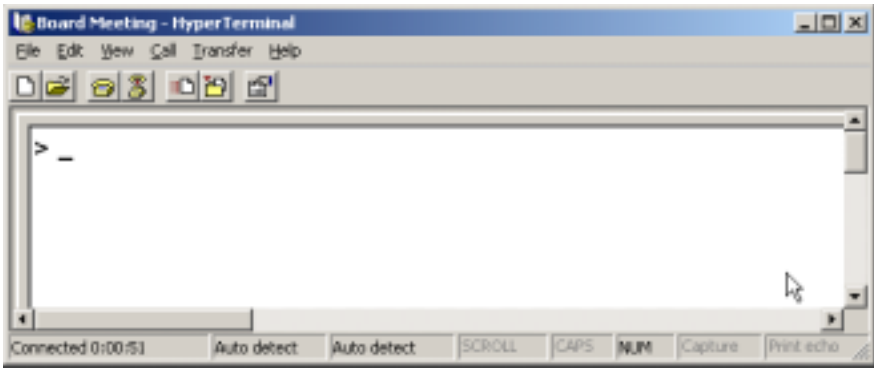


Figure 2-4. Hyperterminal Window (Sample)

Please note:

- ~ If a prompt is displayed in the window (as shown above), your PC is successfully connected to *Quadra*.
- ~ If you do not see a prompt (or any characters), there is a connection problem. Refer to Appendix D, "**Firmware Upgrades and Troubleshooting**" for troubleshooting steps.

7. If a prompt is displayed, you can test out the system. Type:

   `HELP`

   … and press **Enter**.

   - ~ If communications have been set up correctly, *Quadra* responds with a list of commands. Refer to Chapter 4, "**Command Line Interface**" for details.
   - ~ If *Quadra* does not respond, refer to Appendix D, "**Firmware Upgrades and Troubleshooting**" for instructions.

8. Please continue with the "**System Timing**" section.

ETHERNET CONTROL SETUP

Ethernet control enables you to use a Telnet session to control *Quadra* using a command line interface. *Quadra* includes an internal Telnet server which works with standard Telnet clients. A Telnet client is included as a standard item with Windows® operating systems.

Note

If your system cannot locate the Telnet client during the following procedure, there is a most likely a "path" problem. Using Windows Explorer on your PC, search for for "Telnet." Once located, create a desktop shortcut to it.

Use the following steps to control *Quadra* via Ethernet:

1. Ensure that *Quadra*'s Ethernet port is connected to your PC by one of two methods:
   - ~ **Peer-to-peer connection** — *Quadra* is connected directly to your PC, using an Ethernet crossover cable. In Appendix C, see the "**Ethernet Connector**" section for details.
   - ~ **Network connection** — *Quadra* is connected to your LAN, Ethernet hub or Ethernet switch using a standard Ethernet cable.
2. On your PC, launch a command window by clicking **Start > Run**. In the **Run Dialog**, type:

   ```
   cmd
   ```

   … and click **OK**.
3. In the command window, type:

   ```
   telnet <ipaddress> 8000
   ```

   … where <**ipaddress**> represents the current IP address of your *Quadra* and **8000** represents the communications port.

Important

Please note the following important points:

- ~ If you are connecting **peer-to-peer** and you have *not* changed *Quadra*'s IP address, use **192.168.1.200**, *Quadra*'s default IP address.
- ~ If you are connecting **peer-to-peer** or via **network**, and you do not know *Quadra*'s IP address (or if you want to change the IP address), please refer to the "**IP Address Setup**" section in Appendix B.

With the IP address and port properly entered, the Telnet window opens and *Quadra* responds with the product name and copyright notice as shown in the sample below.

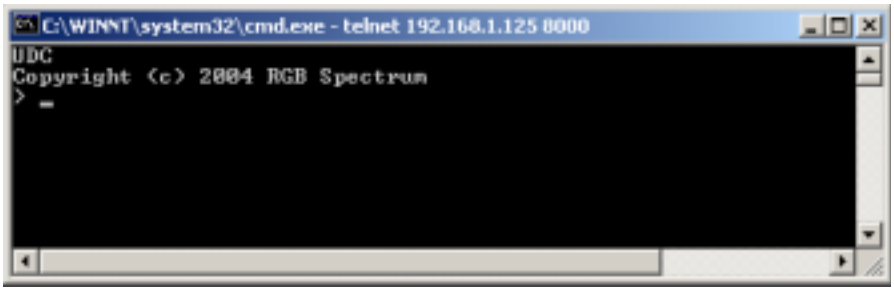


Figure 2-5. *Quadra* **Login (Sample)**

4. To confirm the connection, in the Telnet window type:

   `ID`

   … and press **Enter**. *Quadra* responds with a variety of product details including the unit's IP settings.

   You can now control *Quadra* directly by issuing ASCII commands from the Telnet terminal. Refer to Chapter 4, "**Command Line Interface**" for a complete command list.

Note

To close a Telnet session, type **EXIT** or use the keystroke sequence "**Control + D**."

5. Please continue with the "**System Timing**" section.

SYSTEM TIMING

The following topics are outlined in this section:

- **Introduction to Timing**
- **Output Timing**
- **Advanced Output Timing**
- **Input Timing**

INTRODUCTION TO TIMING

For the best visual results with *Quadra*, the timing parameters of a signal must match the display device. Please note:

- For each of *Quadra*'s four output channels, each channel's output settings should match the connected display.
- For each of *Quadra*'s four graphics inputs, *Quadra*'s input settings should match the characteristics of the input signals.

Quadra can be used with both standard and non-standard display devices. You can allow *Quadra* to automatically "learn" the display's timing parameters, or you can enter your own. Internally, *Quadra* keeps an "**Factory Timing List"** that contains both factory-defined and user-defined timing values.

- The first 99 entries in the **Factory Timing List** are reserved for factory defined entries.
- Entries from 100 to 160 are reserved for user-defined values.
- The "user entry" feature is helpful for storing non-standard timing information, or special applications where a preset timing parameter needs to be adjusted — and then stored in a register. In some cases, you may also need to create your own custom timing parameters.

Quadra performs its timing functions in the following way:

- When you connect a display to one of *Quadra*'s outputs, *Quadra* automatically measures the display's timing parameters.
- *Quadra* then searches the "user entry" section of the **Factory Timing List**. If it finds a match (for example, one that you have previously stored), it selects and loads those parameters.
- If *Quadra* does not find a match in the "user entry" section, it searches through all factory defined entries and loads the closest match.
- If you want to manually enter your own parameter to more closely match those of the selected display monitor, the "**Output Timing**" and "**Advanced Output Timing**" procedure enable you to do so, and store those settings in a memory register.

Important

If you choose to manually enter timing parameters, the output timing procedure should be performed first, followed by the input timing procedure. This sequence should be repeated for each of *Quadra*'s four channels.

OUTPUT TIMING

The **Output Timing** procedure enables you to match a channel's output signal to the graphic display device that is attached to that channel. *Quadra* generates a wide range of preset VESA-compliant output formats, and also enables users to define custom values.

The overall procedure has four parts:

- Learn the characteristics of the display device(s) that are connected to *Quadra*'s output channels.
- For the first output channel, load the required output format using the "**OutPutTiMingLOAD**" function.
- Use your display's controls to center and size the image.
- Repeat the procedure for all remaining output channels and their associated displays.

A list of common device signal types that *Quadra* supports can be found in the

"**Factory Timing List**" in Chapter 4.

Use the following steps to set up the *Quadra*'s output timing.

Note This setup procedure applies to both analog and digital displays.

1. Select the output channel and display device for which you want to set up timing.
2. Obtain a copy of the display device's operations manual or technical guide, and make a note of the following important parameters:
   - ~ **Type:** Is the display device a CRT or LCD device?
   - ~ **Format:** Is the display device Analog or Digital?
   - ~ **Resolution:** Note the display device's native horizontal and vertical resolution (e.g., 1600 x 1200).
   - ~ **Refresh rate:** Note the display device's optimum refresh rate (e.g., 60Hz, 75Hz, etc.).
   - ~ **Sync:** For analog devices, note the type of Sync required (5-wire, 4-wire or 3-wire).
   - ~ **Sync polarity:** Note the preferred sync polarity (positive or negative).
   - ~ **Interlace:** Most graphics displays are non-interlaced, but interlaced signals are used in some special applications. Note the required interlace setting (interlace or non-interlace) for your display.
3. In Chapter 4, review the list of output parameters in the "**Factory Timing List**," and find the set of parameters that *most closely match* those of the display device (as you noted in step 2). Make a note of the **Reference ID** for this set of parameters (column 1 in the Factory Timing List). This ID will be used in a subsequent step.
   - ▲ **Example:** If your monitor is VESA 800 x 600 @ 75Hz, the reference ID is **11**.
   - ▲ **Example:** If your monitor is VESA 1280 x 1024 @ 75Hz, the reference ID is **21**.
4. Ensure that the following connections have been made:
   - ~ *Quadra* is properly connected to the display monitor for the selected output channel.
   - ~ The controlling device (such as an ASCII terminal or PC) is properly connected to the *Quadra* — either via serial or Ethernet connection.

   If required, refer to the "**Installation**" section for instructions.
5. Turn on the *Quadra*.

6. Turn on the display monitor that is connected to the selected output channel.
7. Turn on the controlling device (such as your PC), allowing time for it to boot up.
8. From the PC, establish a serial (or Telnet) connection to *Quadra* (depending upon your configuration). If required, refer to the "**System Control Setup**" section for instructions.
9. With communications properly established, turn on the "Grid" test pattern for the selected output channel. Type:

   `TP <output #> GRID`

   … and press **Enter**. Verify that the grid signal is visible on your display. At this point, however, it may fit properly.
10. Using the **Output Timing Load** function, enter the ID of the timing parameters that you selected in step 3. Type:

    `OPTMLOAD <output #> <1 ... 160>` **Enter**
11. Adjust the *display* to match *Quadra*'s output: Note:

    ~ For a single display, leave the display's "auto-sync" circuitry on. Use the display's **position** and **size** controls to center the test pattern, and ensure that the entire test pattern is completely visible.

    ~ In some special applications, you may choose to change *Quadra*'s output parameters rather than adjust the display device. In this case, use *Quadra*'s **Output Timing Interactive** procedure to match the display settings. Refer to the "**Advanced Output Timing**" section for details.

Note

The **Output Timing Interactive** procedure can also be used to "fine tune" a single display.

12. Turn off the test pattern. Type:

    `TP <output #> OFF` **Enter**
13. With the display adjusted, you can now adjust *Quadra*'s input timing using the **Input Interactive** procedure. Refer to the "**Input Timing**" section for instructions.

ADVANCED OUTPUT TIMING

For most applications and timings, the steps outlined in the previous section are adequate for matching *Quadra*'s output to your display. However, for greater accuracy (particularly with dual or multi-monitor configurations), you can fine-tune output settings using the **Output Timing Interactive** function.

The "interactive" mode places a cursor on screen that defines the boundaries of the output signal (also known as the "active picture"). Unlike other *Quadra* commands, the interactive mode is one that waits for keystrokes to position the picture, while all other commands are locked out.

Additionally, users must "exit" the interactive timing mode before normal command line interface functions can be issued.

Use the following steps to adjust output timing interactively:

1. For the selected output channel and display, ensure that you've followed steps 1 through 9 in the preceding "**Output Timing**" section.
2. Turn on the "Grid" test pattern:

   `TP <output #> GRID` **Enter**
3. For the selected output channel, begin the interactive output timing procedure. Type:

   `OPTMINT <output #>` **Enter**

   A white box appears on the display.
4. Starting with the upper-left corner of the white box, use the keyboard controls listed below to position the top left corner of the box at the top left corner of the display monitor. Note that these adjustment commands *are* case sensitive.

   i = move up **j** = move left
   m = move down **l** = move right

Note These commands are all lower case.

   The goal is to position the upper left corner for maximum image visibility, or for multi-display device configurations, to position the corner to *precisely* match the position of the image on adjacent display.
5. With the upper-left corner properly adjusted, use the keyboard controls listed below to position the bottom right corner of the box at the bottom right corner of the display monitor.

   I = move up **J** = move left
   M = move down **L** = move right

Note These commands are all upper case.

   The goal is to position the bottom right corner for maximum visibility, or for multi-monitor configurations, to position the corner to *precisely* match the position of an adjacent monitor image.
6. To exit the function, type **q**. This returns the system to the "normal" command mode of operation.
7. Repeat steps 2 through 5. This repetition is necessary to accurately fine-tune the timing parameters.
8. Use the **Output Timing Name** function to name the new "custom" timing parameters — up to 23 alphanumeric characters in length. Spaces are not allowed in the name, but underscores and upper/lower case characters are OK.

Type:

`OPTMNAME <output#> [name]` **Enter**

▲ **Example:** To name output 1 "Studio_LCD_1," type:

`OPTMNAME 1 Studio_LCD_1`

9. Once the display is adjusted, use the **Output Timing Save** function to save parameters in memory. *Quadra* allows you to save up to 61 user-defined settings. These settings may then be recalled at any time to quickly change the system's output settings. To save settings in one of 61 available timing slots, type:

`OPTMSAVE <output #> <100 ... 160>` **Enter**

▲ **Example:** To save the timing parameters for output 1 in register 108, type `OPTMSAVE 1 108`, **Enter**.

Every time you turn on the *Quadra*'s power, the last output setting used will be automatically recalled. Note that if an **RFD** (Restore Factory Defaults) is performed, your custom settings will be lost and *Quadra* will start with the factory default output settings.

10. To confirm that your timing set is in the list, type:

`TMLIST 100 160` **Enter**

This action lists the 61 "user" registers.

11. Turn off the test pattern. Type:

`TP <output #> OFF` **Enter**

12. This completes the advanced output timing procedure for the selected output channel. Repeat from step 1 for the remaining output channels as required.

When all output channels have been "timed" interactively, please continue with the "**Input Timing**" procedure outlined below.

INPUT TIMING

When you connect a graphics signal to a *Quadra* input channel, *Quadra* automatically searches for a match between the signal and the list of signal types that it stores internally. This list consists of the combination of standard VESA defined signals and user defined signals.

- If the signal that is found in the list is an exact match, then no further adjustment is needed.
- If some adjustment is required, use the following adjustment procedure and save the new parameters to the user list. In this way, the next time the same signal is connected, no adjustment will be required.

Two command methods are available for adjusting input timing:

- The **Input Timing** function is an advanced feature that enables you to fine-tune each input by entering exact timing numbers. In Chapter 4, refer to the "**Input Commands**" and "**Timing Parameters**" sections for details.

- The **Input Interactive** function enables you to adjust each input's timing interactively. Interactive timing applies only to graphics inputs (not composite or S-Video sources). This method is described below.

Use the following steps to adjust input timing interactively. The procedure takes you through the complete adjustment for one input (including naming and saving settings), and then asks you to repeat steps for each remaining input.

1. Ensure that you have a working serial (or Telnet) connection to *Quadra* (depending upon your configuration).
2. To perform interactive input timing, ensure that the desired input sources are connected to the appropriate *Quadra* input modules. Refer to the "**Installation**" section for instructions.
3. Select the RGB or DVI input type as required for each input using the "**INputSouRCe**" command.

   Type:

   `INSRC <input#> [RGB | DVI | YUV | COMPOSITE1 | COMPOSITE2 | SVIDEO]` **Enter**

   Please note the following points regarding the command's arguments:

   ~ When using an RGB graphic input connected to the RGB connector, select the **`RGB`** argument.

   ~ When using a digital video input connected to the optional DVI connector, select the **`DVI`** argument.

   ▲ **Example:** If a digital (DVI) source is connected to input 2, type **`INSRC 2 DVI`** and press **Enter**.

4. To begin the input timing procedure, type:

   `RSR <input#>` **Enter**

   This action resets the selected input and ensures that there is no image zooming or cropping.

5. To time the input interactively, type:

   `INI <input#>` **Enter**

   A white box appears over the selected full screen input.

▲ **Example:** To adjust input 1 interactively, type:

```
INI 1
```

6. Starting with the upper-left corner of the image, use the keyboard controls listed below to position the image within the white frame. The goal is to position the corner for maximum image visibility. Note that these adjustment commands *are* case sensitive.

   `i` = move up **`j`** = move left
   `m` = move down **`l`** = move right

Note These commands are all lower case.

7. With the upper-left corner properly adjusted, adjust the lower-right corner next by using the following keyboard controls. The goal is to position this corner for maximum image visibility.

   I = move up **J** = move left
   M = move down **L** = move right

Note These commands are all upper case.

8. To exit the function, type **q**. This returns the system to the "normal" command mode of operation.
9. Repeat steps 5 through 7 for the selected input. This repetition is necessary to accurately fine-tune the timing parameters.
10. Use the **Input Name** function to name the input source, up to 23 alphanumeric characters in length. Spaces are not allowed in the name, but underscores and upper/lower case characters are OK. Type:

    `INN <input#> <name>` **Enter**

    ▲ **Example:** To name input 1 "PowerPoint_1," type:

    `INN 1 PowerPoint_1`

11. Use the **Input Save** function to store the selected input's parameters in one of 61 slots in the Input List. These settings are recalled whenever the signal is reapplied to the *Quadra*. Type:

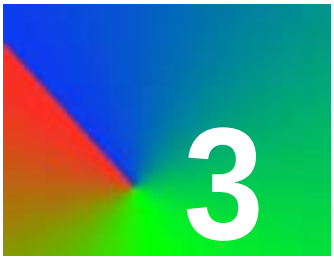
    `INS <input#> <100 ... 160>` **Enter**

    ▲ **Example:** To save input 1 in Input List slot 101, type:

    `INS 1 101`

    This completes the procedure for adjusting, naming and saving the selected input.

12. Repeat steps 4 through 11 for all remaining *Quadra* inputs.



OPERATIONS

IN THIS CHAPTER

This chapter provides operating instructions for a variety of frequently-used *Quadra* features. The following topics are discussed:

INTRODUCTION TO OPERATIONS

The *Quadra* is a high performance, four channel multi-format up/down converter with numerous applications in graphics, displays and multi-monitor environments. Using an easy command line interface, users can convert each input to a different user-defined output format, or take a single distributed input source and "scale" it across multiple displays.

Quadra's features enable you to pan, zoom, and selectively extract any portion of an input signal for cropping or aspect ratio adjustment. You can also easily convert an input source to a lower line rate format.

- In the "individual" channel conversion mode, each input can be converted to a different output format as illustrated below:

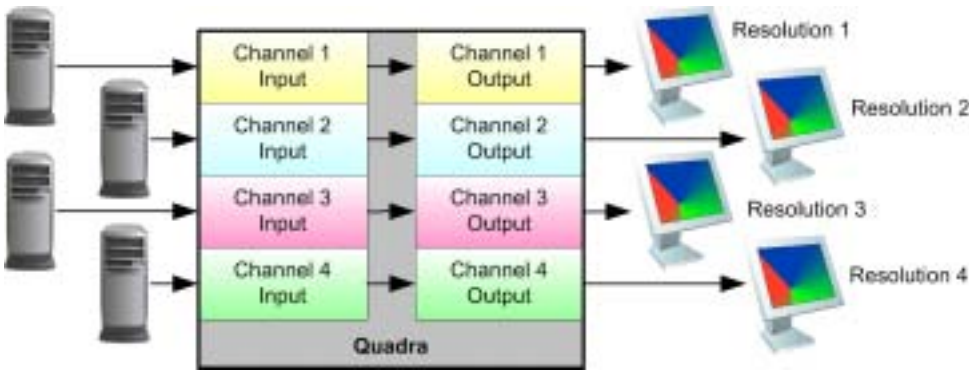


Figure 3-1. Four channel conversion configuration

At your facility, this method is ideal in situations where many different up/down conversion configurations are required.

- In *Quadra*'s 2x2 "wall" configuration, a single distributed source can be scaled across multiple monitors, as shown below:

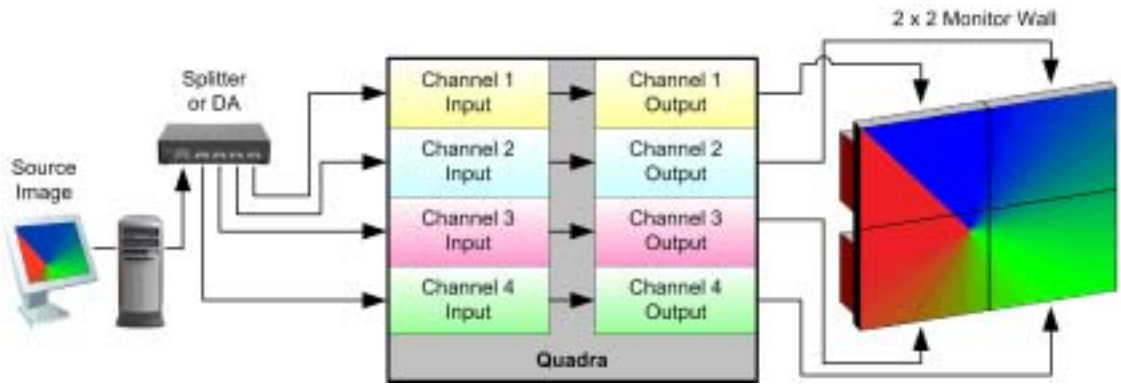


Figure 3-2. 2x2 wall configuration

In this configuration, using an external splitter or DA (Distribution Amplifier), *Quadra* automatically crops each identical input into its proper "quadrant" using the **WALL** command. Refer to the "**Creating a 2x2 Monitor Wall**" section for instructions.

PROCEDURES AND PREREQUISITES

This chapter provides detailed operating procedures for many of *Quadra*'s most frequently used functions. Please note the following recommendations:

- Each procedure assumes that your system is properly connected, configured, and that a "control" method has been established between your PC (or controlling device) and *Quadra*. In Chapter 2, refer to the "**System Control Setup**" section for instructions.
- Ensure that you have a variety of input sources from which to choose. This will allow you to learn *Quadra*'s capabilities to the fullest extend.
- Ensure that you have either an electronic or printed copy of Chapter 4, "**Command Line Interface**" handy for reference.
- Each procedure recommends that you use *Quadra*'s "Help" command to display the available variables, and also recommends that you "query" the current state of the command prior to entering new parameters. These are good *Quadra* habits to develop.
- For reference, each procedure includes a hyperlink to the command's description in Chapter 4.
- Note that the "short forms" of all commands are used in this chapter, as displayed by the **Capital Letters** in each command name. For example, instead of typing **OutPutENable**, simply type **OPEN**.

SETTING OUTPUT FORMAT

The Quadra output should be set to match the characteristics of your display device. This can be accomplished loading the values manually from entries stored in the **Factory Timing List**.", or automatically using information provided electronically from your display (EDID). The latter is supported only for display devices connected to the digital (DVI) output, and only for display devices that support EDID.

This section provides instructions for using the "**OutPutREFerence**" and **OutPutTiMingLOAD** commands.

The **OutPutREFerence** command is used to select between the manual and automatic modes for setting the output timing parameters.

AUTOMATICALLY LOADING OUTPUT PARAMETERS

Use the following steps to set the output reference setting to automatically load output parameters:

1. Ensure that the display(s) that you want to set up are connected to selected *Quadra* outputs.

2. To enable automatic detection and loading of a display timing set type the following command (using upper or lower case characters).

   `H OPREF EDID` **Enter**

- This will cause *Quadra* to read the preferred timing parameters from your display device, and then search for a match in the **Factory Timing List**. If it finds a match (for example, one that you have previously stored), it selects and loads those parameters.
- If *Quadra* does not find a match in the "user entry" section, it searches through all factory defined entries and loads the closest match.

These steps should be repeated for each of the *Quadra* output channels (1 - 4). this command enables you to set the output display parameters, using values that are stored in the system's "**Factory Timing List**."

MANUALLY LOADING OUTPUT PARAMETERS

Use the following steps if you want to manually enter your own output parameters:

1. Ensure that the display(s) that you want to set up are connected to selected *Quadra* outputs.
2. Obtain a copy of the display device's operations manual or technical guide, and make a note of the following parameters: monitor type, format (analog or digital), resolution, refresh rate, sync, sync polarity and interlace.
3. To enable manual loading of a display timing set type the following command (using upper or lower case characters).

   `H OPREF INT` **Enter**

4. Using the command line interface, request help text for the command. Using upper or lowercase characters, type:

   `H OPTMLOAD` **Enter**

   This action displays the command's parameters and arguments in the command window.

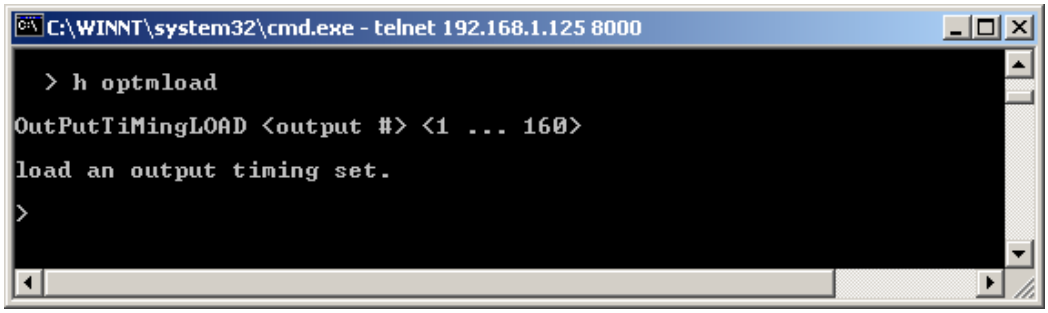


Figure 3-3. Help Text — Output Timing Load Command

5. Show the timing list. Type:

   `TMLIST` **Enter**

6. Review the list in detail, and note the timing parameters that most closely match the specifications of your monitor.
7. Load the timing parameters for the selected output. Type:

   `OPTMLOAD <output #> <register #>` **Enter**
8. Verify that the parameters are loaded by querying the command and the output. Type:

   `OPTM <output #>` **Enter**
9. Repeat from step 1 to set up additional outputs.

TESTING OUTPUTS

This section provides instructions for using the "**TestPattern**" command. For a selected output channel, you can enable a variety of internal test patterns and quickly check your *Quadra*'s outputs.

Use the following steps to test each output:

1. Ensure that the display(s) that you want to test are connected to *Quadra* outputs, and that their output formats have been set as outlined in the "**Setting Output Format**" section.
2. Request help text for the command. Type:

   `H TP` **Enter**

   This action displays the command's parameters and variables.

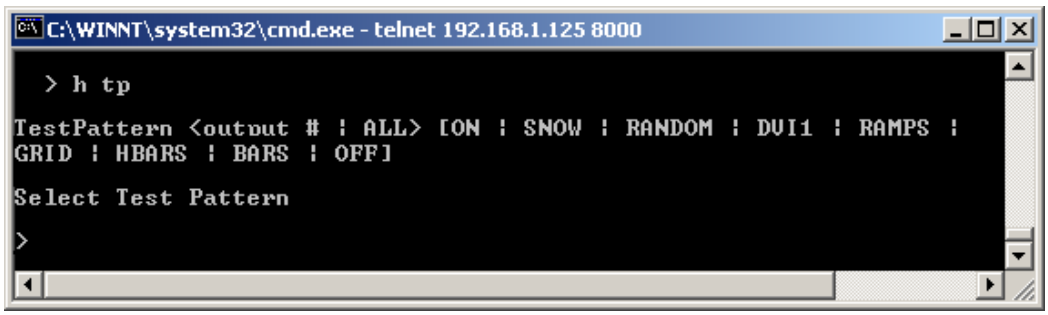


Figure 3-4. Help Text — Test Pattern Command

3. To test a single output, type:

   `TP <output #> [test pattern]` **Enter**

   ▲ **Example**: To display color bars on output 2, type:

   `TP 2 BARS` **Enter**
4. To test all outputs, type:

   `TP ALL [test pattern]` **Enter**

   ▲ **Example**: To display the grid on all outputs, type:

`TP ALL GRID` **Enter**

5. To turn off the test pattern on a single output, type:

   `TP <output #> OFF` **Enter**

6. To turn off the test pattern on all outputs, type:

   `TP ALL OFF` **Enter**

Note

All test patterns are full screen, and override any **WSR** and **WDR** image and output manipulations. When the test pattern is turned off, the previous source is restored exactly.

SELECTING AN INPUT SOURCE

This section provides instructions for using the "**INputSouRCe**" command. This command enables you to switch between input sources for each of *Quadra*'s four input channel. Each input supports up to four sources: composite, RGB/component, S-Video and (optionally) DVI.

Use the following steps to select input sources:

1. Ensure that a variety of input sources are connected to *Quadra*'s input channels. A sample connection is shown below for a single channel:

Figure 3-5. Full array of input connections

2. Request help text for the command. Type:

   `H INSRC` **Enter**

   This action displays the command's parameters and variables.

Figure 3-6. Help Text — Input Source Command

3. Query the command for the selected channel, to determine what the current input source is. Type:

   `INSRC <input #>` **Enter**

4. To switch sources for a selected input, type:

   `INSRC <input #> [desired source]` **Enter**

   ▲ **Example**: To switch input 1 to DVI, type:

   `INSRC 1 DVI` **Enter**

5. Repeat from step 3 to switch additional inputs.

ENABLING AND DISABLING OUTPUTS

This section provides instructions for using the "**OutPutENable**" command. With this command, you can enable or disable one (or all) *Quadra* outputs. In addition, using the optional duration parameter, you can fade an output to (or from) black with fade durations up to 128 seconds.

Note

When you fade or disable an output, all **WSR** and **WDR** parameters are retained.

Use the following steps to enable or disable outputs:

1. Request help text for the command. Type:

   `H OPEN` **Enter**

   This action displays the command's parameters and variables.

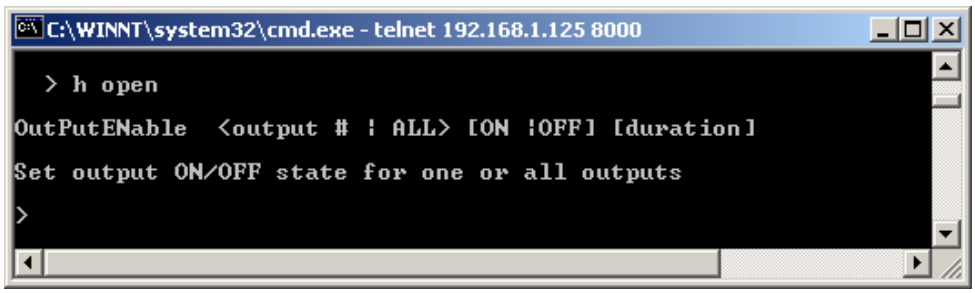


Figure 3-7. Help Text — Output Enable

2. To disable a selected output, type:

   `OPEN <output #> OFF` **Enter**

   ▲ **Example**: To disable output 4, type:

   `OPEN 4 OFF` **Enter**

3. To disable all outputs, type:

`OPEN ALL OFF` **Enter**

4. To enable a selected output, type:

   `OPEN <output #> ON` **Enter**

5. To fade a selected output to black with a duration, type:

   `OPEN <output #> OFF [duration]` **Enter**

   ▲ **Example**: To fade output 3 to black in 4 seconds, type:

   `OPEN 3 OFF 4` **Enter**

   ▲ **Example**: To fade all outputs up from black in 2.5 seconds, type:

   `OPEN ALL ON 2.5` **Enter**

UNDERSTANDING AUTO SYNC

The following topics are discussed in this section:

AUTO SYNC OVERVIEW

Quadra's Auto Sync command (**INputAutoSync**) sets the input mode for a specified input.

- When **`ON`**, the autosync circuitry is enabled. If an input signal is re-synchronized, the current **`WSR`** settings are automatically reset to full size (similar to performing the **ResetSourceRectangle** function).
- When **`OFF`**, the autosync circuitry is disabled, and the **`WSR`** settings are retained — even with a loss of the input signal.

With Auto Sync enabled, *Quadra* automatically syncs to the **RGB** signals connected to the various inputs. The Auto Sync function has no effect on **Composite** or **S-Video** input sources, as those format definitions are well-known and easy to auto detect.

However, because there are many different RGB graphics formats with differing standards, blankings, aspect ratios and sync requirements, *Quadra* maintains an extensive **Factory Timing List** of the standard formats. This list can be used to set output timing parameters (as describe in the "**Setting Output Format**" section), or used to "force" an input to a specific timing set.

When RGB inputs are first connected and when Auto Sync is enabled, *Quadra* measures the input signals, discovers their properties, and compares those properties against the entries in the **Factory Timing List**. The "user" section (registers 100-160) is searched first, because the user may have stored specific "custom" timings. The "factory" section (registers 1-99) is searched next.

Once a close match is found for each RGB input, *Quadra* tries to lock to it — or continues down the list until a "lock" is achieved.

LOADING INPUT TIMING VALUES

To load a different set of parameters or "create" your own, Auto Sync can be disabled — and you can force *Quadra* to load a custom set of parameters.

Use the following steps to load timing values:

1. To discover which set of timing parameters are currently loaded, query the **INputTiMing** command for a selected input. Type:

   `INTM <input #>` **Enter**

   The display shows the input name and all the various parameters. If the name "**Auto_1**" appears, this indicates the active register for automatic settings when Auto Sync is enabled. (There are four "**Auto_1**" registers, one for each *Quadra* input.)

2. Request help text for the **INputLOAD** command. Type:

   `H INLOAD` **Enter**

   This action displays the command's parameters and variables.

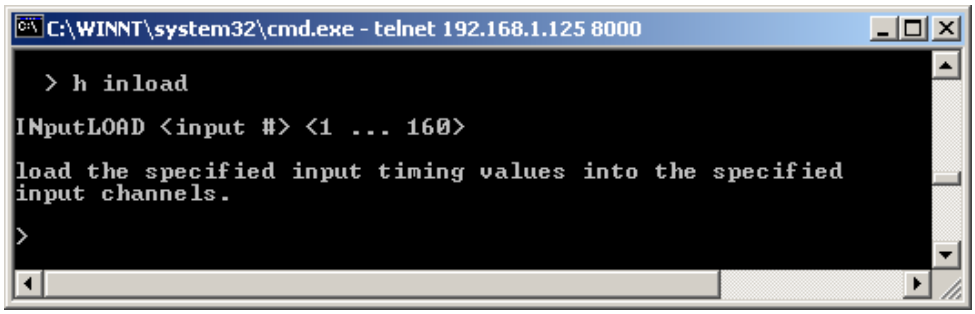


Figure 3-8. Help Text — Input Load Command

3. Show the timing list. Type:

   `TMLIST` **Enter**

4. Review the **Factory Timing List** in detail, and note the timing parameters that most closely match the specifications of your input.

5. Turn off Auto Sync for the selected input. Type:

   `INAS <input #> OFF` **Enter**

6. Load the desired timing parameters for the selected input. Type:

   `INLOAD <input #> <register #>` **Enter**

7. Verify that the parameters are loaded by querying the command and the input. Type:

   `INTM <input #>` **Enter**

8. Repeat from step 1 to load custom timings for additional inputs.

Please note:

- If you want to "interactively" time an input, please continue with the "**Performing Interactive Input Timing**" section.
- To name and save a custom set of input timing parameters, continue with the "**Naming and Saving Input Timing Values**" section.

PERFORMING INTERACTIVE INPUT TIMING

If you want to "fine tune" a set of timing parameters *visually*, you can use the **INputINTeractive** command. Using a white box which appears around the input image, you can precisely align the upper left and lower right corners of the image — precisely scaling the image to match the display raster.

The procedure is fully explained in the "**Input Timing**" section in Chapter 2.

NAMING AND SAVING INPUT TIMING VALUES

If you have loaded a custom set of timing parameters or performed the "Interactive" timing adjustment, it is highly recommended that you name and store the settings in the "user" section of the **Factory Timing List**. In this way, the next time *Quadra* is turned on and RGB inputs are used, when the "Auto Sync" search through the list is performed, your saved settings will be loaded.

Use the following steps to name your custom timings:

1. Request help text for the **INputNAME** command. Type:

   `H INNAME` **Enter**

   This action displays the command's parameters and variables.

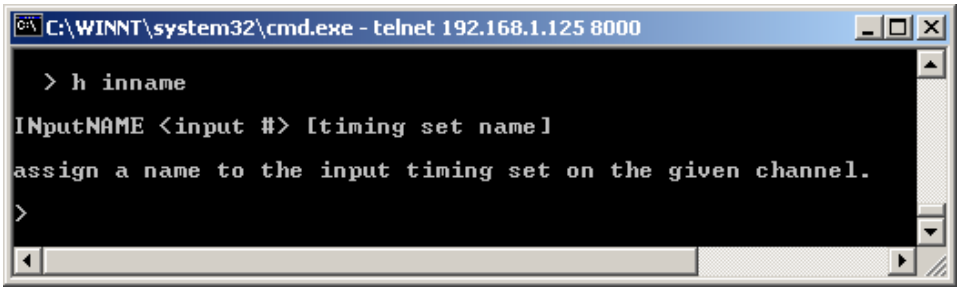


Figure 3-9. Help Text — Input Name Command

2. To name the specified RGB input timings, type:

   `INNAME <input #> [name]` **Enter**

   The name can be up to 23 alphanumeric characters in length, with no spaces (use an underscore for a space).

   ▲ **Example**: To name RGB input 3 as "Boardroom PC 1," type:

   `INNAME 3 Boardroom_PC_1` **Enter**

3. Confirm the name by querying the command. Type:

   `INNAME <input #>` **Enter**

4. Request help text for the **INputSAVE** command. Type:

`H INSAVE` **Enter**

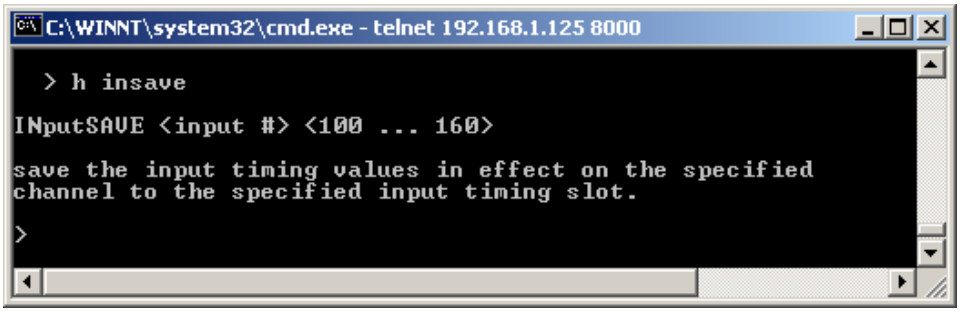


Figure 3-10. Help Text — Input Save Command

5. To save the specified RGB input in a "user" register, type:

   `INSAVE <input #> <100...160>` **Enter**

   ▲ **Example**: To name RGB input 3 in register 101, type:

   `INSAVE 3 101` **Enter**

6. Confirm the name and the storage register by viewing the timing list. Type:

   `TMLIST` **Enter**

   Scroll through the list as required to confirm the name and register.

Tip

When Auto sync is enabled, *Quadra* searches through the user portion of the timing list first, starting at register 100. If the system locates two "similar" sets of parameters, it loads the first one that it finds. If you want to ensure that a particular register is loaded, place it earlier in the timing list.

CROPPING AN IMAGE

This section provides basic instructions for using the WSR command (**WindowSourceRectangle**). The command enables you to define a precise portion of an input source, which is then mapped to the output using the WDR command (**WindowDestinationRectangle**).

Please note:

- By default, **WSR** shows the entire source image as defined by the horizontal and vertical dimensions of the selected RGB input.
- For a video input, **WSR** defaults to 720 x 480 for NTSC and 720 x 574 for PAL.

Using the command, you can "jump" a source image's size and position from one setting to another instantly, or *transition* the image between settings with a duration of up to 128 seconds.

Use the following steps to crop a source image.

1. Request help text for the **WindowSourceRectangle** command. Type:

   `H WSR` **Enter**

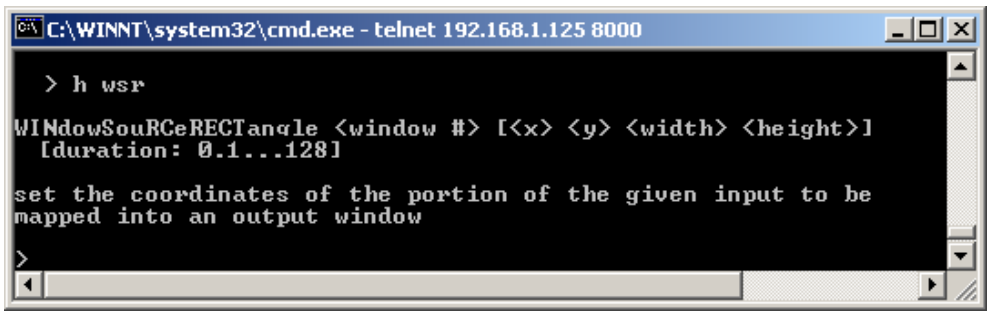


Figure 3-11. Help Text — Window Source Rectangle Command

2. Query the input timing to verify the actual dimensions of the source. This gives you a basis for further scaling. Type:

   `INTM <input #>` **Enter**

3. Query the current size and position of the image: Type:

   `WSR <input #>` **Enter**

4. If desired, reset the source image to its default full screen value. Type:

   `RSR <input #>` **Enter**

5. Scale and position the image as desired. Type:

   `WSR <input #> <x> <y> <width> <height> <duration>` **Enter**

   Note that the **x** and **y** parameters define the coordinates of the first pixel located at the top left of the image. The width and height parameters then define the size of the image.

▲ **Example:** Crop input 1 to 800 x 600, starting at the exact top left corner of the image. Type:

`wsr 1 0 0 800 600` **Enter**

▲ **Example:** Crop input 2 to 300 x 300, starting 500 pixels over from the left, and 10 lines down. Type:

`wsr 2 500 10 300 300` **Enter**

▲ **Example:** Assuming a 1280 x 1024 source image for input 4, crop off 100 pixels around the edge. Type:

`wsr 4 100 100 1080 824` **Enter**

▲ **Example:** From input 1's current position, zoom in to the upper left quadrant in 5 seconds. Type:

`wsr 1 0 0 400 300 5` **Enter**

▲ **Example:** From input 1's current position, zoom out to full screen in 8.2 seconds (assuming 800 x 600). Type:

`wsr 1 0 0 800 600 8.2` **Enter**

Please note:

- Remember that the horizontal and vertical sizes can be adjusted independently. For example, if you simply want to "stretch" an image horizontally, enter the same values for **`x`**, **`y`** and **`height`**, and simply change the **`width`**.
- In Appendix A, refer to the "**Image Rectangles**" section for addition details on **`WSR`** and **`WDR`** commands.

ZOOMING AN IMAGE

The zoom function enables you to interactively zoom an image's **WSR** coordinates. Use the following steps to zoom an image:

1. Request help text for the **ZooM** command. Type:

   `H ZM` **Enter**

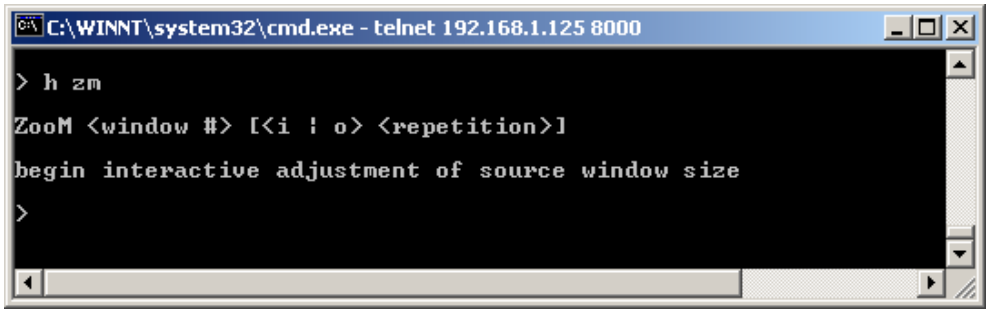


Figure 3-12. Help Text — Zoom Command

2. Activate the "interactive" zoom function. Type:

   `ZM <input #>` **Enter**

   Use the following controls to zoom. Type

   - **i** to zoom in
   - **o** to zoom out

3. When you are finished zooming, type **q** to exit the mode:

Please note:

- The zoom function zooms straight in (or out) using the image's current **WSR** values.
- You can also zoom in or out by a fixed amount of repetitions.

  ▲ **Example:** Zoom out by 10 units. Type:

  `ZM <input #> o 10`

  Note that 10 units is equivalent to:

  - a vertical zoom factor of 10 x 4
  - a horizontal zoom factor of 10 x 4 x aspect ratio
- You can not pan an image unless it is zoomed in. Refer to the "**Panning an Image**" section for details.

PANNING AN IMAGE

The pan function enables you to interactively pan an image's **WSR** coordinates, effectively moving only the **x** and **y** coordinates while maintaining the **height** and **width** parameters.

Use the following steps to pan an image:

1. Request help text for the **PAN** command. Type:

   `H PAN` **Enter**

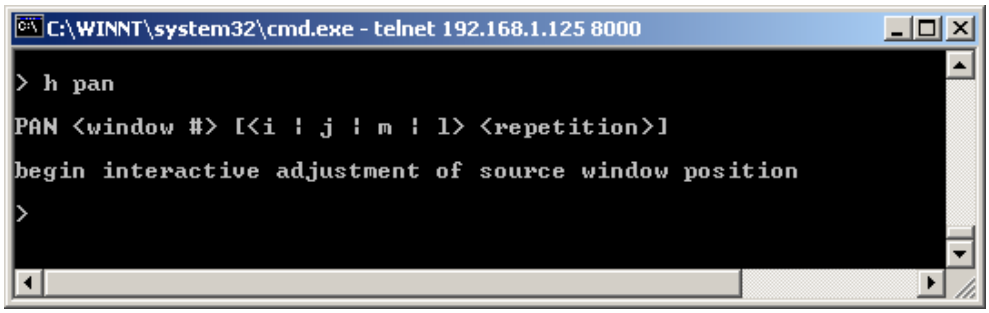


Figure 3-13. Help Text — Pan Command

2. Ensure that the image has been zoomed or cropped before proceeding. A full-size source image can not be panned.
3. Activate the "interactive" pan function. Type:

   `PAN <input #>` **Enter**

   Use the following controls to pan. Type:

   - ~ **i** to pan up
   - ~ **m** to pan down
   - ~ **j** to pan left
   - ~ **l** to pan right

4. When you are finished panning, type **q** to exit the mode:

Please note:

- You can also pan by a fixed amount of repetitions. Type:

  ▲ **Example:** Pan right by 10 increments. Type:

  `PAN <input #> r 10`

  Note that the pan increment is step size (r) x current SET RATE setting.

SIZING THE OUTPUT IMAGE

This section provides basic instructions for using the WDR command (**WindowDestinationRectangle**). The command enables you to define the size and position of the "output" rectangle — the rectangle to which the source rectangle (**WindowSourceRectangle**) is mapped.

Using the command, you can "jump" a channel's output rectangle from one setting to another instantly, or *transition* the output between settings with a duration of up to 128 seconds.

Please note:

- The output rectangle can be positioned and sized so that part of it is positioned off screen.
- **WDR** values are limited to the output resolution of the selected *Quadra* output channel (full screen display).

Use the following steps to size the output image.

1. Request help text for the **WindowDestinationRectangle** command. Type:

   `H WDR` **Enter**

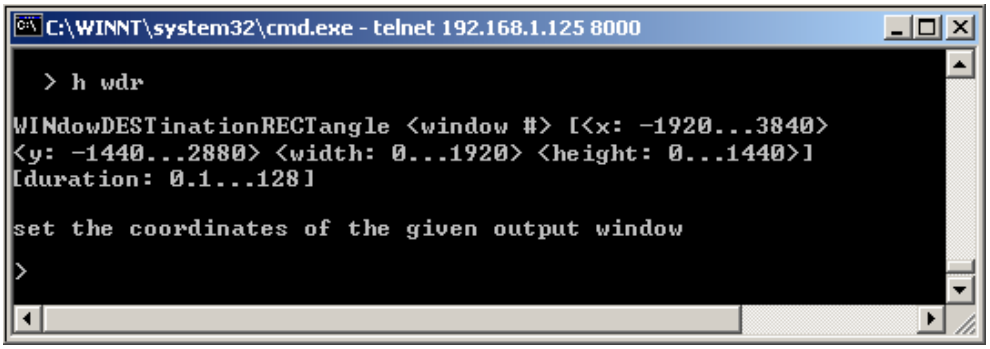


Figure 3-14. Help Text — Window Destination Rectangle Command

2. Query the output timing to verify the output display's actual dimensions. This gives you a basis for setting the output rectangle's parameters. Type:

   `OPTM <output #>` **Enter**

3. Query the current size and position of the output rectangle: Type:

   `WDR <input #>` **Enter**

4. Size and position the output rectangle as desired. Type:

   `WDR <output #> <x> <y> <width> <height> <duration>` **Enter**

   Note that the **x** and **y** parameters define the coordinates of the first pixel located at the top left of the output rectangle. The width and height parameters then define the size of the rectangle.

▲ **Example:** Assuming an output resolution of 1024 x 768, set output 1 to full screen. Type:

`wdr 1 0 0 1024 768` **Enter**

▲ **Example:** Place a 100 pixel by 100 line video window at column 300, line 400 on the monitor for output 2. Type:

`wdr 2 300 400 100 100` **Enter**

▲ **Example:** From a full screen output 1 rectangle, transition the rectangle (in 5 seconds) to approximately center screen in an 800 x 600 window. Type:

`wdr 1 230 200 800 600 5` **Enter**

▲ **Example:** Assuming an output resolution of 1280 x 1024 and a full screen image, slide the image off screen (to the left) in 2.5 seconds. Type:

`wdr 1 -1280 0 1280 1024 2.5` **Enter**

Please note:

- In Appendix A, refer to the "**Image Rectangles**" section for addition details on **WSR** and **WDR** commands.
- You can interactively move the **WDR** using the **POSition** and **SETRATE** commands. Refer to the "**Using Position**" section for instructions.

USING POSITION

With a defined **WDR** rectangle, you can interactively move the rectangle around the selected output screen using the **SETRATE** and **POSition** commands.

Please note:

- The **SETRATE** command determines the number of pixels that the selected output rectangle moves — each time a **Position** command is issued. For example, a "SETRATE" of (1,1) causes small, smooth jumps, while (10,10) causes larger incremental jumps in the position of the selected output rectangle.
- The **POSition** command is the actual mode that enables you to move an output rectangle left, right, up or down.

Use the following steps to interactively position the output image.

1. Request help text for the **SETRATE** command. Type:

   `H SETRATE` **Enter**

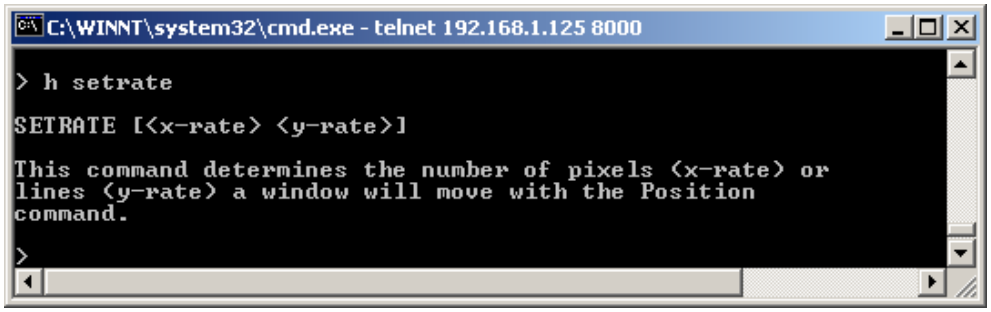


Figure 3-15. Help Text — Setrate Command

2. Query the current **SETRATE** value. Type:

   `SETRATE` **Enter**

3. Change the **SETRATE** value as desired. Type:

   `SETRATE <x-rate> <y-rate>` **Enter**

   ▲ **Example:** Set the image to jump 5 pixels **x** and 5 pixels **y**, each time a **Position** command is issued. Type:

   `SETRATE 5 5` **Enter**

4. Request help text for the **POSition** command. Type:

   `H POS` **Enter**

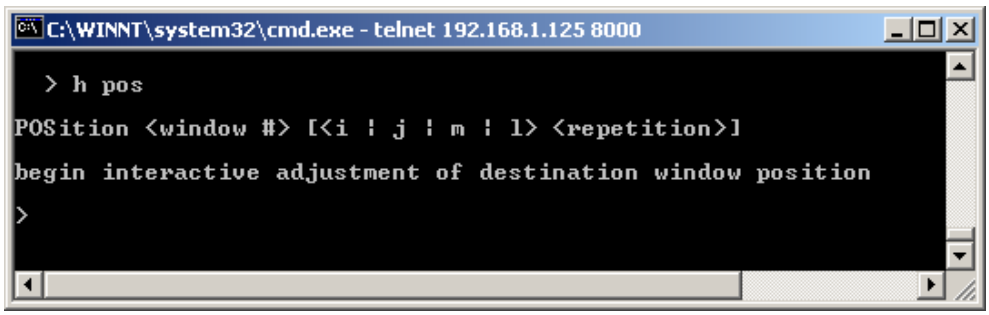


Figure 3-16. Help Text — Position Command

5. Change the **Position** interactively as desired. Type:

   `POS <output #>` **Enter**

   Use the following controls to position the rectangle. Type:

   - **i** to move the rectangle up
   - **m** to move the rectangle down
   - **j** to move the rectangle left
   - **l** to move the rectangle right

   Note that the rectangle jumps at the designated **SETRATE** increment.

6. When you are finished positioning, type **q** to exit the mode:

ADJUSTING BRIGHTNESS AND CONTRAST

Quadra enables you to easily adjust a source image's brightness and contrast using the **BRIghtness** and **CONTrast** commands.

1. Request help text for the **BRIghtness** command. Type:

   `H BRI` **Enter**

Figure 3-17. Help Text — Brightness Command

2. Query the source's current brightness. Type:

   `BRI <input #>` **Enter**

3. Adjust the brightness as desired, from -500 to +500. Type:

   `BRI <input #> [brightness value]` **Enter**

4. Request help text for the **CONTrast** command. Type:

   `H CONT` **Enter**

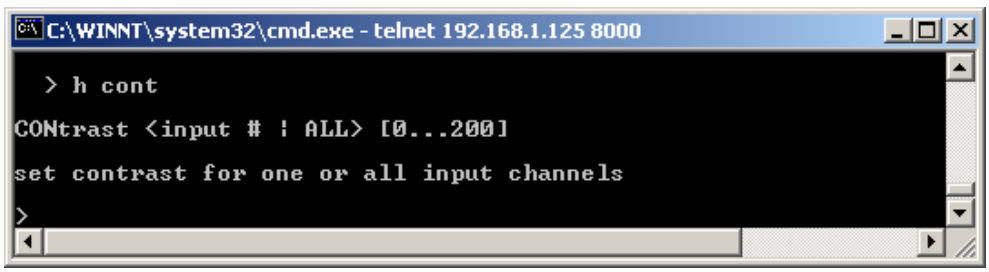


Figure 3-18. Help Text — Contrast Command

5. Query the source's current contrast. Type:

   `CONT <input #>` **Enter**

6. Adjust the contrast as desired, from 0 to 200. Type:

   `CONT <input #> [contrast value]` **Enter**

ADJUSTING HUE AND SATURATION

Quadra enables you to easily adjust a source image's hue and saturation using the **HUE** and **SATuration** commands.

1. Request help text for the **HUE** command. Type:

   `H HUE` **Enter**

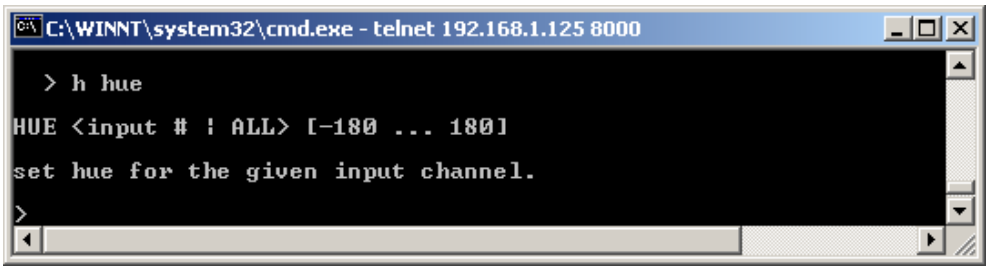


Figure 3-19. Help Text — Hue Command

2. Query the source's current hue. Type:

   `HUE <input #>` **Enter**

3. Adjust the hue as desired, from -180 to +180 (degrees). Type:

   `HUE <input #> [hue value]` **Enter**

4. Request help text for the **SATuration** command. Type:

   `H SAT` **Enter**

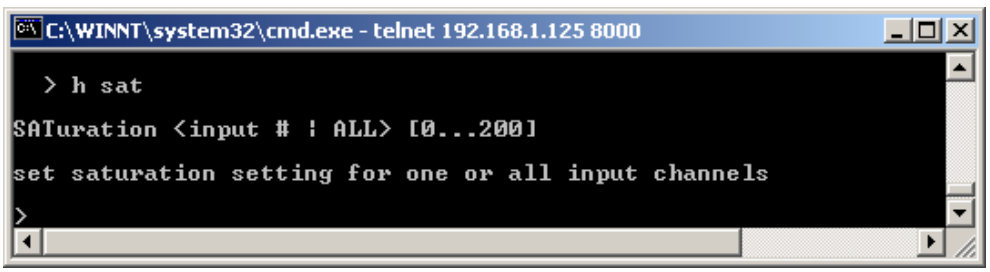


Figure 3-20. Help Text — Saturation Command

5. Query the source's current color saturation. Type:

   `SAT <input #>` **Enter**

6. Adjust the color saturation as desired, from 0 to 200. Type:

   `SAT <input #> [saturation value]` **Enter**

Note that a saturation of **`0`** (zero) is a full monochrome image.

ADJUSTING SHARPNESS

Quadra enables you to easily adjust a source image's sharpness using the **SHARPness** command.

1. Request help text for the **SHARPness** command. Type:

   `H SHARP` **Enter**

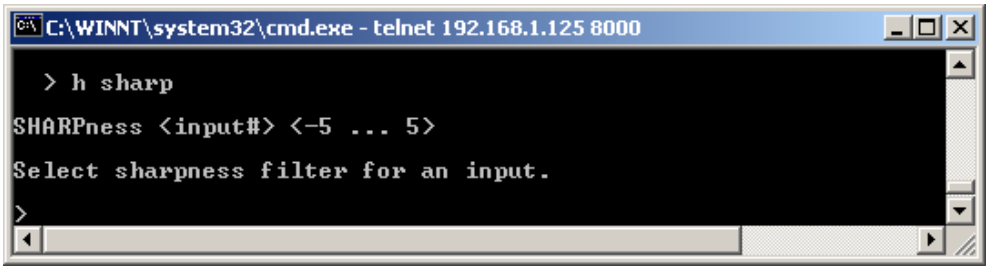


Figure 3-21. Help Text — Sharpness Command

2. Query the source's current sharpness. Type:

   `SHARP <input #>` **Enter**

3. Adjust the sharpness as desired, from -5 (soft) to +5 (sharp). Type:

   `SHARP <input #> [sharpness value]` **Enter**

Note that a value of **0** (zero) turns sharpness off.

CREATING A BACKGROUND

Quadra enables you to set an output channel's background color, from a solid color to a shaded "ramp" using the **BackGroundSouRCe** command.

1. Request help text for the **BackGroundSouRCe** command. Type:

   `H BGSRC` **Enter**

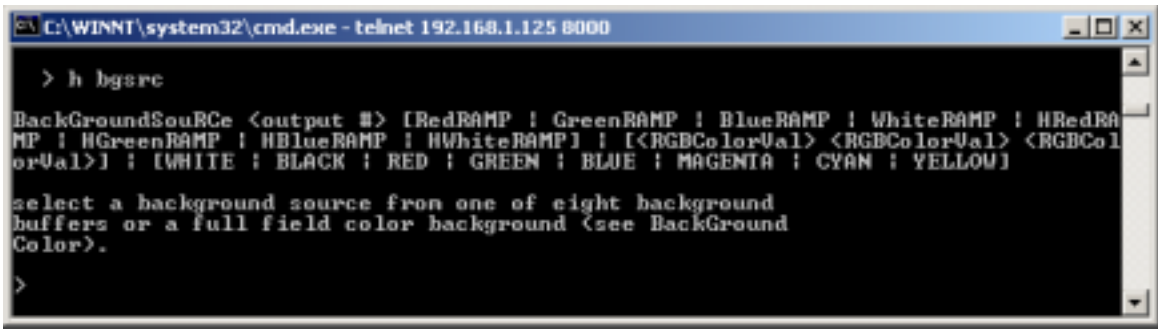


Figure 3-22. Help Text — Background Source Command

2. Query the source's current background color. Type:

   `BGSRC <input #>` **Enter**

3. Change the source's background as desired. Type:

   `BGSRC <input #> [background selection]` **Enter**

   ▲ **Example:** Set the background to solid blue for input 1. Type:

   `BGSRC 1 BLUE` **Enter**

   ▲ **Example:** Set the background to a red vertical ramp for input 3. Type:

   `BGSRC 3 REDRAMP` **Enter**

   ▲ **Example:** Set the background to a green horizontal ramp for input 1. Type:

   `BGSRC 1 HGREENRAMP` **Enter**

   ▲ **Example:** Set the background to a custom RGB color for input 4 (e.g., 13 **red**, 161 **green**, 238 **blue**). Type:

   `BGSRC 4 13 161 238` **Enter**

Note that available RGB values are 0 - 255 for each color.

CREATING A 2X2 MONITOR WALL

Using the **WALL** command, you can quickly crop all four inputs, configuring each input's **WSR** to exactly 1/4 of the screen. With your output channels properly connected to a 2x2 monitor wall display, you're ready to go with one easy command.

Use the following steps to create a 2x2 monitor wall.

1. Externally to *Quadra*, split your input source into four identical signals using a customer-supplied splitter or a DA (**Distribution Amplifier**). Refer to **Figure 3-2** for reference.
2. Connect each identical source to *Quadra*'s four input channels.
3. Ensure that each input's timing is properly (and identically) set. Refer to the "**Loading Input Timing Values**" for instructions.
4. Ensure that each output's timing is properly (and identically) set Refer to the "**Setting Output Format**" for instructions.
5. Connect *Quadra*'s outputs to your monitor wall as follows:
   - ~ Connect output #1 to the top left monitor.
   - ~ Connect output #2 to the top right monitor.
   - ~ Connect output #3 to the bottom left monitor.
   - ~ Connect output #4 to the bottom right monitor.
6. Request help text for the **WALL** command. Type:

   `H WALL` **Enter**

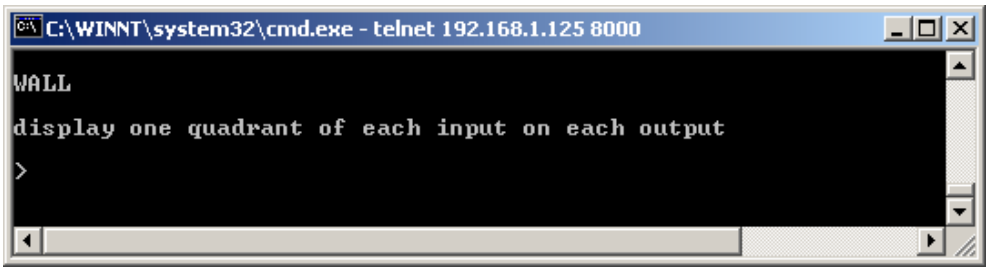


Figure 3-23. Help Text — Wall Command

7. Issue the **Wall** command. Type:

   `WALL` **Enter**

   When the command has been executed, each quadrant is properly cropped and positioned as follows:
   - ~ Input #1 is cropped to the exact upper left quadrant of the source image.
   - ~ Input #2 is cropped to the exact upper right quadrant of the source image.

- Input #3 is cropped to the exact lower left quadrant of the source image.
- Input #4 is cropped to the exact lower right quadrant of the source image.

The net result on your 2x2 monitor wall is a perfectly expanded source image.

8. To switch back to full size inputs on each output channel, use the **UDC** command. Type:

`UDC` **Enter**

4 COMMAND LINE INTERFACE

This chapter discusses *Quadra* control commands that provide access to all of the unit's functions. The following topics are discussed:

- **Control Overview**
- **Command Format**
- **Command Set List**
- **Command Summary**
- **Timing Parameters**
- **Factory Timing List**

CONTROL OVERVIEW

Quadra may be controlled externally via RS-232, or via the unit's Ethernet 10/100BASE-T port, as shown below.

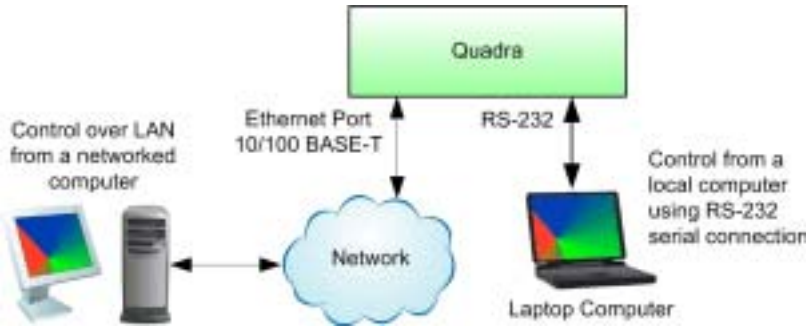


Figure 4-1. *Quadra* **Control Methods**

Quadra's **Command Set** provides full system control, and with few exceptions, all commands can be issued using either the serial port or the Ethernet port (using a Telnet session). Exceptions are noted in the command descriptions.

Remember that control via Ethernet requires a connection using *Quadra*'s IP address. In Chapter 2, refer to the "**System Control Setup**" section for instructions.

COMMAND FORMAT

All *Quadra* control functions are issued via ASCII commands that are used to set one or more system parameters (or values). Typically, *Quadra* is controlled by a third party machine such as a PC or laptop.

The following topics are discussed in this section:

- **Command Line Usage**
- **Command Help**
- **Predefined Parameter Values**
- **Query the Current Setting**
- **Parameter Ranges**
- **Addressable Commands**
- **Optional Parameters**

COMMAND LINE USAGE

All commands take the following form:

```
COMMAND NAME <value1> <value2>...
```

… followed by **Enter**.

Parameter values are shown in angle brackets < >. In the above example, value1, value2 (etc.) are *required* parameters specific to the stated command.

▲ **Example**: Set *Quadra*'s baud rate to 9600 bps:

```
BAUDRATE 9600
```

The majority of commands have both long and short forms:

- The long form version is an easily understood word (or the concatenation of two or more words).
- The short form version is a brief, one to seven letter abbreviation of the command.

Note

With the exception of several "interactive" functions, commands are not case sensitive. In the **Command Set List**, upper case characters in the long form version indicate the letters required for the short form version.

In the example above, the command "**BAUDrate**" could be entered four different ways:

```
BAUDRATE
baudrate
BAUD
baud
```

To execute commands, each command line must be followed by a carriage return (pressing **Enter**).

COMMAND HELP

▲ **Commands:** "**Help**"

There are two primary ways to use the *Quadra*'s help feature:

- Type `HELP` to list all *Quadra* commands.
- Type `HELP` followed by the command to get command-specific help.
  - ▲ **Example:** Type `H BRI` to get help on the **Brightness** function.
  - ▲ **Example:** Type `H WSR` to get help on the **Window Source Rectangle** function.

PREDEFINED PARAMETER VALUES

Some commands have predefined values, and only these may be used as parameter choices. Predefined parameter choices are indicated as

```
<value1|value2|value3>
```

▲ **Example:** The choices for **`BAUDrate`** are:

```
<9600 | 19200 | 38400 | 57600 | 115200>
```

QUERY THE CURRENT SETTING

When a command is entered without any parameters, *Quadra* reports back the current settings of the selected parameter.

▲ **Example:** What is the current baud rate setting ?:

```
BAUDrate
```

would return:

```
9600
```

PARAMETER RANGES

Parameter values may be a "range" of values, or a defined set of choices (as described above in the "**Predefined Parameter Values**" section).

Ranges are indicated as:

```
<value1 ... value2>
```

▲ **Example**: The value of **`BRIght`** is a range of

```
<-500 ... 500>
```

ADDRESSABLE COMMANDS

Commands such as **`BAUDrate`** do not need an explicit address, as *Quadra* has only a single serial port. However, other commands can be applied to several destinations. For example the "brightness" command can apply to all *Quadra* inputs or to an individual input — depending upon how the command sequence is structured.

An individual destination is indicated by the parameter such as **<input#>**, and is typically the first parameter following the command name.

▲ **Example:** Set input #1's brightness value to 50:

```
BRIght 1 50
```

Many commands allow the use of the optional modifier **ALL** which enables you to set all applicable destinations with one command. The command parameter will then be indicated in the following form:

```
<parameter|ALL>
```

The **ALL** modifier is useful for setting all inputs to the same value.

▲ **Example:** Set the brightness value of all inputs to 0:

```
BRIght ALL 0
```

OPTIONAL PARAMETERS

Some commands have optional parameter values that are *not required* in a command. These discretionary values are indicated by square brackets **[]**:

```
COMMAND <value> [<value2>]
```

VideoAspect is a command with optional parameters. In this example, **<value>** is a required parameter and **[<value2>]** is optional:

```
VideoAspectRatio <input #> [NORMAL | WS1 | WS2 |
WS3 | WS4]
```

In this case, the command may be used to query the VideoAspectRatio settings by using only the input #.

COMMAND SET LIST

The following sections list the commands used for controlling the *Quadra*. A table of all commands is provided, followed by lists arranged according to categories:

- **Command Summary**
- **Input Commands**
- **Output Commands**
- **Display Commands**
- **Image Control Commands**
- **Serial Port Commands**
- **Network Commands**
- **Miscellaneous Commands**

Note

It is recommended that you take the time to review each of these command lists, trying as many commands as possible with your *Quadra*. In that way, you will quickly become familiar with the machine's full capabilities, in addition to improving your operational skill.

COMMAND SUMMARY

This section provides a table of all *Quadra* commands in alphabetical order. Click the desired command to access detailed instructions. You may also want to print this list and keep it near your PC for reference.

Table 4-1. Command Summary

BackGroundSouRCe	**IPGateWay**	**SHARPness**
BAUDrate	**IPSubNET**	**SIZE**
BRIghtness	**MACADDRess**	**STATus**
CONTrast	**OutPutENable**	**SYStemReSeT**
ECHO	**OutPutREFerence**	**TestPattern**
FReeZe	**OutPutTiMing**	**TiMingDELete**
GAMma	**OutPutTiMing INTeractive**	**TiMingLIST**
HANDShaking	**OutPutTiMingLOAD**	**TiMingLISTCLEAR**
Help	**OutPutTiMingNAME**	**TiMingLISTLOAD**
HUE	**OutPutTiMingSAVE**	**UDC**
ID	**OVerScan**	**UNderScan**
INputAutoSync	**PAN**	**UpdateFirmWare**
INputFormat	**POSition**	**VERsion**
INputINTeractive	**RECALLCONFIGuration**	**VideoAspectRatio**
INputLOAD	**ResetSourceRectangle**	**VideoInterlaceFiLteR**
INputNAME	**RestoreFactoryDefaults**	**WALL**
INputPHASE	**SATuration**	**WindowDestinationRectangle**
INputSAVE	**SAVECONFIGguration**	**WINdowENable**
INputSouRCe	**SETRATE**	**WindowSourceRectangle**
INputTiMing	**SETTINGSEXPORT**	**ZooM**
IPADDRess	**SETTINGSIMPORT**	

INPUT COMMANDS

Input commands allow you to make input adjustments, and then save these settings into the unit's internal memory. A summary of input commands is listed below. Click the desired command to access detailed instructions.

Table 4-2. Input Commands Summary

Command	Description
INputAutoSync	Sets the input mode for the specified input.
INputFormat	Checks the video format of the current video input selection.
INputINTeractive	Enters input interactive mode to visually adjust an input's timing parameters.
INputLOAD	Loads the indicated entry from the **Input List** to the specified input channel.
INputNAME	Names the specified input.
INputPHASE	Adjusts the phase of the Analog/Digital Converter to optimize picture quality.
INputSAVE	Saves the specified input to the selected entry in the **Input List**.
INputSouRCe	Selects the analog or digital graphics source for the specified input.
INputTiMing	Sets the selected input's timing
TiMingLIST	Displays the entire **Timing List** of saved input timings.
TiMingLISTCLEAR	Deletes all user-defined input timing sets.
TiMingDELete	Deletes the specified entry from the **Timing List**.
TiMingLISTLOAD	Loads a complete set of timing parameters to the specified timing list entry.

Refer to the "**Input Commands Descriptions**" section for descriptions of all input commands.

INPUT COMMANDS DESCRIPTIONS

The table below lists all input commands, their arguments and detailed descriptions.

Table 4-3. Input Commands Descriptions

Command	Arguments	Description
INput**A**uto**S**ync	<input # | ALL> [ON | OFF | DEBUG]	Sets the input mode for the specified input. **ON** enables the autosync circuitry. **OFF** disables the autosync circuitry. When Autosync is enabled (**ON**), the current WSR settings are automatically reset to full size when the input signal is re-synchronized. When Autosync is disabled (**OFF**), the WSR settings are retained even with a loss of the input signal. **Debug** provides information on input status and reports changes to measured parameters. Default: **ON**
INput**F**ormat	<input #>	Checks the video format of the current video input selection. The command is only valid when **INputSouRCe** is set to Composite or S-Video. The response to the command will be NTSC or PAL.
INput**INT**eractive	<input#>	Enters input interactive mode to visually adjust specified input's timing parameters. A white box appears over the full screen input. Starting with the upper-left corner of the image, use these keyboard controls to position the image within your display raster: **i** = move up **j** = move left **m** = move down **l** = move right With the upper-left corner properly adjusted, address the lower-right corner next by using these keyboard controls: **I** = move up **J** = move left **M** = move down **L** = move right With the image properly adjusted, quit the utility: **q** = quit After you have adjusted the input to your satisfaction, use the **INputNAME** command to name your input source, and the **INputSAVE** command to store the setting to the **Input List**.

Table 4-3. Input Commands Descriptions(Continued)

Command	Arguments	Description
INput**LOAD**	<input #> <1…160>	Loads the indicated entry from the **Timing List** to the specified input channel. Timing list entries from 1 to 99 are reserved for factory defined timing parameters. Entries from 100 to 160 are available for user defined timing entries. The entry is loaded only if it matches the measured signal parameters — sync format and polarity, interlace state, vertical total, and horizontal frequency.
INput**NAME**	<input #> [timing set name]	Names the specified input. The argument can be up to 23 alphanumeric characters with no spaces (use underscore for space). Default: **`Auto_1`**
INput**PHASE**	<graphics input#> [0 … 31]	Adjusts the phase of the Analog/Digital Converter to optimize picture quality. Applies to Analog RGB inputs only. Default: **`24`**
INput**SAVE**	<input#> <100…160>	Saves the input timing parameters for the specified input to the selected entry in the **Input List**. Whenever a signal is applied to the graphics input the signal parameters are measured and compared to entries in the list. When a match is found it is applied to the *Quadra*.
INput**S**ou**RC**e	<input#> [RGB | DVI | YUV | COMPOSITE1 | COMPOSITE2 | SVIDEO]	Selects the analog or digital graphics source for the specified input. Default: **`RGB`**
INput**T**i**M**ing	<input #> [<hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact>] | [HFP | HS | HBP | HACT | VFP | VS | VBP | VACT] [value]	Defines the active area of the input signal and the selected input's timing. Using this command, the user can set all timing parameters as query or set the value of an individual parameter. For example to query the value of vertical sync width issue the command **`INTM VS`**. Horizontally, the active part of the signal is **`<hact>`**. The inactive part (h blanking) is **`<hfp> + <hs> + <hbp>`**. The total number of pixels horizontally is **`htotal`** = (h blanking) + **`<hact>`**. Note that the pixel clock frequency = **`hfreq x htotal`** so changing the total horizontal pixel count (**`htotal`**) will directly change the frequency of the sample clock. The active part of the vertical component of the signal is **`<vact>`**. The inactive part (v blanking) is **`<vfp> + <vs> + <vbp>`**. The total number of lines is **`vtotal`** = (v blanking) + **`<vact>`**. Since *Quadra* knows the total line count an error will result if the sum of the active and inactive parts entered in the command do not match the measured total line count. Refer to the "**Timing Parameters**" section for details on timing parameters.

Table 4-3. Input Commands Descriptions(Continued)

Command	Arguments	Description
Ti**M**ing**LIST**	<1 … 160> [<1 … 160>]] | [ACTIVE]	Displays the entire **Timing List**. If arguments are supplied, displays only the portion of the list requested. The **`Active`** argument displays all saved list entries.
Ti**M**ing**LISTCLEAR**	none	Deletes all user defined input timing sets. This does not affect the factory specified timing entries 1…99
Ti**M**ing**DEL**ete	<100 … 160>	Deletes the specified timing list entry. Timing list entries 1…99 are reserved for factory specified timing and may not be deleted.
Ti**M**ing**LISTLOAD**	<100…160> <name> <hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact> <hfreq> <sync> <hpol> <vpol> <il>	Enables users to completely define an input signal. This does not require an input signal to be present to do so. **`TimingListLoad`** could be used to enter the list entries one by one. • The first argument, <100…160> indicates the **Timing List** entry number in which to store the timing string. • The second argument, **`<name>`**, gives a customized name to the signal. • The next eight arguments, **`<hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact>`**, define the signal's timing. • The next five arguments, **`<hfreq> <sync> <hpol> <vpol> <il>`**, define the horizontal frequency, sync format and polarity, and interlace status. All 15 arguments must be supplied for the command to be successful. Refer to the "**Timing Parameters**" section for details.

OUTPUT COMMANDS

Output commands control *Quadra*'s output channels. They define the output timing and sync format, and save, load, and delete timings to the Output List. A summary of output commands is listed below. Click the desired command to access detailed instructions.

Table 4-4. Output Commands Summary

Command	Description
OutPutENable	Switch or fade the output to or from black.
OutPutREFerence	Selects the output's timing reference.
OutPutTiMing	For the selected output channel, sets the output timing by parameter.
OutPutTiMing INTeractive	Enters the interactive output timing adjustment mode for the selected output channel.
OutPutTiMingLOAD	For the selected output channel, sets output display parameters from values stored in **Factory Timing List**.
OutPutTiMingNAME	For the selected output channel, assigns a user-defined name to the **Factory Timing List** entry in use.
OutPutTiMingSAVE	For the selected output channel, saves the current output timing settings to the specified user timing slot.

Refer to the "**Output Commands Descriptions**" section for a complete description of all output commands.

OUTPUT COMMANDS DESCRIPTIONS

The table below lists all output commands, their arguments and detailed descriptions.

Table 4-5. Output Commands Descriptions

Command	Arguments	Description
Out**P**ut**EN**able	<output # | ALL> [ON | OFF] [duration]	Enables or disables the specified output signal. When used with the optional duration parameter, the output fades to black for the specified duration. The duration parameter has a range of 0.1…128.0 seconds. Default: **`ON, duration = 1.0`**
Out**P**ut**REF**erence	<output # | ALL> [EXT | INT]	Selects the output timing reference for the specified output. • When **`INT`** is selected, the output is locked to an internally generated clock (also known as Free Run mode). • When **`EXT`** is selected, the output is locked to the input signal connected to input #1. Default: **`INT`**
Out**P**ut**T**i**M**ing	<output #> [<hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact> [<hfreq> <sync> <hpol> <vpol> <il>]] | [HFP | HS | HBP | HACT | VFP | VS | VBP | VACT | HFREQ | SYNC | HPOL | VPOL | IL] [value]]	This advanced mode sets the output timing by output channel and by parameter. The command supports the ability to set all parameters at once, or the ability to set (or query) the status of individual parameters. Refer to the "**Timing Parameters**" section for details on all timing parameters.
Out**P**ut**T**i**M**ing **INT**eractive	<output #>	Enters the interactive output adjustment mode for the selected output channel. This function enables you to optimize the output timing values to better suit your display. Once in the interactive mode, a white box appears on the output display. Starting with the upper-left corner of the box, use these keyboard controls: **`i`** = move up **`j`** = move left **`m`** = move down **`l`** = move right With the upper-left corner properly adjusted, address the lower-right corner next by using these keyboard controls: **`I`** = move up **`J`** = move left **`M`** = move down **`L`** = move right With the image properly adjusted, quit the utility: **`q`** = quit

Table 4-5. Output Commands Descriptions(Continued)

Command	Arguments	Description
Out**P**ut**T**i**M**ing**LOAD**	<output #> <1 … 160>	For the selected output channel, sets the output display parameters from values stored in the specified **Factory Timing List**. Timing list entries 1… 99 are reserved for factory defined timing parameters. Entries 100 … 160 are user-defined. Refer to the "**Factory Timing List**" for details on all entries and timings.
Out**P**ut**T**i**M**ing**NAME**	<output #> [name]	For the selected output channel, assigns a user-defined name to the **Factory Timing List** entry currently in use. The name text string can be up to 23 alphanumeric characters with no spaces (use underscore in place of a space).
Out**P**ut**T**i**M**ing**SAVE**	<output #> <100 … 160>	For the selected output channel, saves the current output timing settings to the specified user timing slot.

DISPLAY COMMANDS

Display commands apply to positioning and visibility, and enable you to control the display configuration, zoom and pan operations, freezing inputs and more. A summary of commands is listed below. Click the desired command to access detailed instructions.

Table 4-6. Display Commands Summary

Command	Description
OVerScan	Performs an automatic 2% enlargement on video inputs only.
PAN	Activates the pan utility for the selected input.
POSition	Allows you to move an input window around the output display.
ResetSourceRectangle	Resets source rectangle to default values.
SETRATE	Determines the number of pixels an output rectangle moves with the **POSition** command.
SIZE	Activates size utility to resize the specified input.
UDC	Configures *Quadra* to route full size images to each output.
UNderScan	For the specified input, turns the Underscan feature on and off.
VideoAspectRatio	Identifies “letterbox” inputs to display without black borders.
VideoInterlaceFiLteR	Selects the type of de-interlace filter for the specified input.
WALL	Configures *Quadra* to route 1/4 size images (quadrants) to each output.
WindowDestinationRectangle	Sets both the position and size of an input’s destination rectangle.
WINdowENable	Turns the specified channel on or off.
WindowSourceRectangle	Sets the source rectangle for the selected input.
ZooM	Activates the zoom utility.

Refer to the “**Display Commands Descriptions**” section for a complete description of all positioning, visibility and display commands.

DISPLAY COMMANDS DESCRIPTIONS

The table below lists all positioning, visibility and display commands, including their arguments and detailed descriptions.

Table 4-7. Display Commands Descriptions

Command	Arguments	Description
OVer**S**can	<input #> [ON | OFF]	Performs an automatic 2% enlargement on video inputs only. It has no effect on **WSR** values, and it applies to all video inputs for the specified channel. **Overscan** is useful in trimming out excess blanking in video signals, or "head switching" for VTR sources. Unlike **WSR**, when **Overscan** is turned on, the enlargement is automatic and constant even when switching between the various video input types. Default: **OFF**
PAN	<input #> [<i | j | m | l> <repetition>]	Activates the pan function for the selected input. Only a zoomed input can be panned. Controls are listed below: **i** = pan up **j** = pan left **m** = pan down **l** = pan right **q** = quit
POSition	<output #> [<direction> <repetition>]	Activates the position utility, allowing you to move the specified input window around the specified output. Controls are listed below: **i** = move up **m** = move down **j** = move left **l** = move right **q** = quit The **direction** and **repetition** arguments allow you to repeat a movement in one direction without repeatedly pressing the key. For example, to move output 1 to the left 20 times, type: `POS 1 j 20` The actual pixel or line increments that a window moves is determined by the **Setrate** command. In the above example, the window moves 400 pixels to the left (20 times the default rate of 20 pixels). **Position** affects the **WDR** value for the input.
Reset**S**ource**R**ectangle	<input #>	Resets the source rectangle (**WSR**) to default value that is equal to the HACT and VACT measurements of the specified input signal. Note **RSR** "unzooms" a zoomed image.
SETRATE	<x-rate> <y-rate>	Determines the number of pixels (x-rate) or lines (y-rate) an output rectangle moves with the **POSition** command. Default: x = **20**, y = **20**

Table 4-7. Display Commands Descriptions(Continued)

Command	Arguments	Description
SIZE	<input #> [<s | l> <repetition>]	Activates the size utility, allowing you to resize the specified input. Controls are: **s** = smaller **l** = larger **q** = quit **Size** affects the WDR value for the input.
UDC	(none)	Configures *Quadra* so that each input is set to full size. See also: **WALL**
UNder**S**can	<input #> [ON | OFF]	For the specified input, turns the Underscan feature on and off. When enabled, it expands the displayed image to include part of the blanking interval.
Video**A**spect**R**atio	<video input #> [NORMAL | WS1 | WS2 | WS3 | WS4]	Identifies inputs with letterbox displays so that they may be displayed without black borders. Valid for video inputs only. Use this command when using a wide screen display with letterboxed video. • Normal = 1.33:1 • WideScreen1 = 1.66:1 • WideScreen2 = 1.78:1 • WideScreen3 = 1.85:1 • WideScreen4 = 2.35:1 Default: **NORMAL**
Video**I**nterlace**F**i**L**te**R**	<input #> [NORMAL | TEMPORAL | ADAPTIVE]	Selects the type of de-interlace filter for the specified input. Applies to composite or S-Video inputs only.
WALL	(none)	Configures *Quadra* to operate as a simple 2x2 splitter for wall applications. As a prerequisite, the source must be split into four sources *externally* (using a distribution amplifier). Each identical source must then be routed to all four *Quadra* inputs. When this command has been executed, a different quadrant of each input is positioned on a defined output channel in the following fashion. • The top left quadrant of input #1 is connected to output #1. • The top right quadrant of input #2 is connected to output #2. • The lower left quadrant of input #3 is connected to output #3. • The lower right quadrant of input #4 is connected to output #4. To switch back to full size inputs on each output channel, use the **UDC** command.

Table 4-7. Display Commands Descriptions(Continued)

Command	Arguments	Description

Window**D**estination**R**ectangle	<output #> [<x: -1920...3840> <y: -1440...2880> <width: 0…1920> <height: 0...1440>] [duration: 0.1…128]	Sets both the position and size of an input's destination rectangle. The optional duration argument specifies the duration (in seconds) of a transition from the current WDR parameters to the new WDR parameters.
		• The **<x>** and **<y>** arguments represent the monitor coordinates of the rectangle's top left corner, but hardware limitations may cause the actual placement to differ slightly from that specified. (When you read **WDR** for any input, the numbers given accurately reflect the hardware state.)
		• The **<width>** and **<height>** arguments represent the pixel width and line height of the destination rectangle. **width** range is 1…1920, **height** range is 1… 1440.
		The rectangle can be positioned and sized so that part of it is positioned off screen. **WDR** is limited to the output resolution of the *Quadra* (full screen display).
		Example: With an output host resolution of 1024 x 768, set output 4 to full screen:
		`>WDR 4 0 0 1024 768`
		Example: Place a 100 pixel by 100 line video window at column 300, line 400 on the monitor for output 2:
		`>WDR 2 300 400 100 100`
		Example: Make a 5 second transition from the current **WDR** to a 600 pixel by 600 line window, starting at column 100, line 100 for output 1:
		`>WDR 1 100 100 600 600 5`

WINdow**EN**able	<output # | ALL> [<ON |OFF> [duration: 0.1 ... 128]]	Turns the specified input on or off. The **WINEN ALL** command is used to turn all inputs on or off simultaneously. Each input may be faded using the optional duration parameter (range 0.1 … 128.0 seconds). Default: **ALL ON**

Table 4-7. Display Commands Descriptions(Continued)

Command	Arguments	Description

Window**S**ource**R**ectangle	<input #> [<x> <y> <width> <height>] [duration: 0.1…128]	Sets the source rectangle for the selected input. The source rectangle is the portion of the original input that is displayed on screen.
		• By default, **WSR** is set to show the entire image. That is, the default value for RGB inputs is equal to the HACT and VACT measurements of the specified input signal.
		• For video, **WSR** defaults to 720x480 for NTSC and 720x574 for PAL.
		The optional duration argument is used to transition the WSR to the new settings over the specified duration period.
		The source rectangle is used to zoom in or out on an image. The **<x>** and **<y>** coordinates represent the coordinate screen starting point from which to draw the supplied values of **<width>** and **<height>**.
		Example: To zoom in on the upper left quadrant of an 800x600 input, **WSR** values are:
		`wsr <input#> 0 0 400 300`
		Example: To display only the bottom right quadrant, **WSR** values are:
		`wsr <input#> 400 300 400 300`
		Example: The full, default source rectangle for this 800x600 input is:
		`wsr <input#> 0 0 800 600`
		Example: Zoom in to the upper left quadrant in 5 seconds:
		`wsr <input#> 0 0 400 300 5`
		Note that since the horizontal and vertical size can be adjusted independently, this command can be used to stretch or squeeze an image.
		WSR resets to the default value whenever the signal is acquired or reacquired. If you remove or replace the input signal — or if you change the source on a single channel (using **INputSouRCe**), **WSR** resets to the default values for the newly acquired signal.

Zoo**M**	<input #> [<i | o> <repetition>]	Activates the zoom utility. **Zoom** affects the **WSR** value for the input. Controls are: **i** = zoom in **o** = zoom out **q** = quit Zoom range is to a single pixel. **Zoom** resets to an unzoomed state whenever the signal is acquired or reacquired. If you remove or replace the input signal or if you change the source on a single channel (using **INputSouRCe**), **Zoom** resets to the default values for the new signal.

IMAGE CONTROL COMMANDS

After you have made adjustments with the Input commands, you can use the image control commands to adjust parameters such as brightness, contrast and color. A summary of commands is listed below. Click the desired command to access detailed instructions.

Table 4-8. Image Control Commands Summary

Command	Description
BRIghtness	Sets the brightness value of the selected input.
CONTrast	Sets the contrast value of the selected input.
FReeZe	Turns freeze status of the selected input on or off.
GAMma	Sets a gamma value for the selected *Quadra* output channel.
HUE	Sets the hue value of the selected input.
SATuration	Sets the saturation value of the selected input.
SHARPness	Enables or disables the filter for the selected input.

Refer to the "**Image Control Commands Descriptions**" section for a complete description of all image control commands.

IMAGE CONTROL COMMANDS DESCRIPTIONS

The table below lists all image control commands, their arguments and detailed descriptions.

Table 4-9. Image Control Commands Descriptions

Command	Arguments	Description
BRIghtness	<input # | ALL> [-500 … 500]	Sets the brightness value of the selected input. The **ALL** argument sets brightness for all four inputs. Default: **0**
CONTrast	<input # | ALL> [0 ... 200]	Sets the contrast value of the selected input. The **ALL** argument sets contrast for all four inputs. Default: **100**
FRee**Z**e	<input # | ALL> [ON | OFF]	Turns freeze status of the selected input **on** or **off**. Changes to the Brightness, Contrast, Saturation, Hue and Filter parameters made during a freeze, will not be applied until after the Freeze is turned off. **Note**: Any change to the output timing resets the freeze status to off. Default: **OFF**
GAMma	<output #> [0.5 … 2.0]	Sets a gamma value for the specified *Quadra* output channel. The translation between electrical input and light output of display devices varies by the type of device. This command is used to match the specified *Quadra* channel to the connected display. Changing gamma affects the gamma of all inputs channels. Default: **1.0**
HUE	<input # | ALL> [-180 … 180]	Sets the hue value of the selected input. Use the **ALL** argument to set the hue for all inputs simultaneously. Default: **0**
SATuration	<input # | ALL> [0...200]	Sets the saturation value of the selected input. Use the **ALL** argument to set the hue for all inputs simultaneously. Default: **100**
SHARPness	<input#> [-5…5]	Sets the sharpness setting for the selected input. Positive values sharpen the image and negative values soften the image. A value of zero sets turns sharpness off. Default: **0**

SERIAL PORT COMMANDS

Serial Port Commands are used to control the baud and echo settings. A summary is listed below. Click the desired command to access detailed instructions.

Table 4-10. Serial Port Commands Summary

Command	Description
BAUDrate	Sets the serial port baud rate.
ECHO	Turns the serial echo On/Off.
HANDShaking	Sets the flow control mode.

Refer to the "**Serial Port Commands Descriptions**" section for a complete description of all serial port commands.

SERIAL PORT COMMANDS DESCRIPTIONS

The table below lists all serial port commands, their arguments and detailed descriptions.

Table 4-11. Serial Port Commands Descriptions

Command	Arguments	Description
BAUDrate	[9600 | 19200 | 38400 | 57600 | 115200]	Sets the serial port *baud* rate. The value is automatically saved in NVRAM. Default: **9600**
ECHO	[ON | OFF]	Turns the serial echo On/Off. The value is saved in the NVRAM. The **echo** is only present on commands typed and sent to the unit from the serial port. There is no echo on a Telnet connection. **Note:** The **Echo** setting has no effect on responses issued by the *Quadra*; responses are always visible, regardless of the **echo** status. Default: **ON**
HANDShaking	[HW | SW]	Sets the flow control mode for the serial port. • The HW option provides hardware handshaking. • The SW option provides for software XON/XOFF flow control.

NETWORK COMMANDS

Network Commands control the settings for *Quadra*'s Ethernet port. The values used in this section are typically provided by your facility's IT specialist. A summary is listed below. Click the desired command to access detailed instructions.

Table 4-12. Network Commands Summary

Command	Description
IPADDRess	Sets the IP address for the *Quadra*.
IPSubNET	Sets the IP subnet mask for the *Quadra*.
IPGateWay	Sets the *Quadra*'s IP default gateway.
MACADDRess	Displays the *Quadra* Ethernet MAC address

Refer to the "**Network Commands Descriptions**" section for a complete description of all network commands.

NETWORK COMMANDS DESCRIPTIONS

The table below lists all network commands, their arguments and detailed descriptions.

Table 4-13. Network Commands Descriptions

Command	Arguments	Description
IPADDRess	[ddd.ddd.ddd.ddd]	Sets the IP address for the *Quadra*. To determine the current IP address, enter the command without an IP address. **Note:** New IP address settings will not be applied until after a system reset. See also **IPGateWay** and **IPSubNET**. Default: **`192.168.1.200`**
IPSub**NET**	[ddd.ddd.ddd.ddd]	Sets the IP subnet mask. This setting may need to be changed to suit the configuration of your network. To determine the current IP subnet setting, enter the command without the subnet mask. Default: **`255.255.255.0`**
IPGate**W**ay	[ddd.ddd.ddd.ddd]	Sets the IP default gateway. This setting may need to be changed to suit your network's configuration. To determine the current IP gateway, enter the command without an address. Default: **`192.168.1.1`**
MACADDRess		Displays the current Ethernet MAC address. **Note:** This is a read only command.

MISCELLANEOUS COMMANDS

The Miscellaneous commands category control includes a variety of general *Quadra* functions. A summary of commands is listed below. Click the desired command to access detailed instructions.

Table 4-14. Miscellaneous Commands Summary

Command	Description
BackGroundSouRCe	Selects a colored or shaded background that appears behind an output channel.
Help	Displays the entire serial command set or provides help on specific commands.
ID	Displays system information including firmware version numbers.
RestoreFactoryDefaults	Restores all user settings to their factory default values.
RECALLCONFIGuration	Recalls configuration parameters that were saved manually.
SAVECONFIGguration	Manual save of the system's NVRAM.
SETTINGSEXPORT	Exports an ASCII file of system settings to the terminal or controller.
SETTINGSIMPORT	Accepts ASCII data relating to system settings.
STATus	Returns the status of the *Quadra* and its current settings.
SYStemReSeT	Resets the *Quadra* system (software reset).
TestPattern	Turns on the designated Test Pattern.
UpdateFirmWare	Updates the firmware for the *Quadra*.
VERsion	Returns firmware, hardware and bootcode revision information.

Refer to the "**Miscellaneous Commands Descriptions**" section for a complete description of all miscellaneous *Quadra* commands.

MISCELLANEOUS COMMANDS DESCRIPTIONS

The table below lists all miscellaneous commands, their arguments and detailed descriptions.

Table 4-15. MIscellaneous Commands Descriptions

Command	Arguments	Description
Back**G**round**S**ou**RC**e	<output #> [RedRAMP | GreenRAMP | BlueRAMP | WhiteRAMP | HRedRAMP | HGreenRAMP | HBlueRAMP | HWhiteRAMP] | [<RGBColorVal> <RGBColorVal> <RGBColorVal>] | [WHITE | BLACK | RED | GREEN | BLUE | MAGENTA | CYAN | YELLOW]	Selects a shaded or solid background for the specified output. For example: • RedRAMP provides a red background shaded from top to bottom of the output. • HRedRAMP provides a red background that is shaded from left to right. To select a solid background color, enter the RED, GREEN or BLUE color values (0… 255) for the required color, or select one of the eight pre-defined saturated colors. To turn off a shaded background use **BGSRC 0 0 0** or the command **BGC BLACK**.
Help	[command]	**Help**, without an argument, displays the entire serial command set. **Help**, with a command as an argument, displays detailed information about that command.
ID	(none)	Quadra responds to this command with a list of system information. The list consists of firmware and hardware version numbers and other system information such as the IP address.
Restore**F**actory**D**efaults	(none)	Restores all user settings to their factory default values and restarts the system.
RECALLCONFIGuration	(none)	Manually recalls (restores) customer configuration parameters that were manually saved by the **SAVECONFIGguration** command. **Note:** The configuration is automatically saved after every change. The system configuration is automatically restored following a power cycle. This command could be used as the user specified alternative to **RestoreFactoryDefaults**.
SAVECONFIGguration	(none)	Forces an update and explicit save of the system's NVRAM. This is used to provide user defined default settings. **Note:** These settings are loaded only when the **RECALLCONFIGuration** command is used. The configuration that is loaded following a power cycle represents the state of the machine prior to loss of power, not those saved by this command.

Table 4-15. MIscellaneous Commands Descriptions(Continued)

Command	Arguments	Description
SETTINGSEXPORT	[TIMING | WINDOW | SYSTEM | ALL] [filename]	This command enables you to store *Quadra* settings on an external computer. This is useful in backing up settings, or providing the ability to "clone" the settings on multiple *Quadra* devices. Storing this data is a two step process: • Create a text file named "**export.txt**" that is stored in *Quadra* memory. • Upload this file to your PC. Please note the following important rules: • You can specify your own filename using the optional filename argument. • To save timing, window (display) and system parameters together, use the **ALL** option. Issuing the command without an argument also accomplishes this. • Alternatively you can save just the individual **TIMING**, **WINDOW** or **SYSTEM** parameters. • To save only the user defined timing values, use the **TIMING** argument. • If you wish to save only the window preset parameters for each active window preset, use the **WINDOW** argument. If you wish to save only the system parameters for the current system settings, use the **SYSTEM** argument. Note that this does not include the settings saved in the **SAVECONFIGguration** register. Use the following procedure to save your settings: • Create the file using the **SETTINGSEXPORT** command from the Telnet or serial port. • Log in to the FTP server in *Quadra*. • Enter the user name "**rgb**" (lower case) and the password "**spectrum**." • Use the FTP command "**get export.txt**" to move the file from *Quadra* to your PC. • Type "**close**" to log off the FTP server. See also: **SETTINGSIMPORT**.

Table 4-15. MIscellaneous Commands Descriptions(Continued)

Command	Arguments	Description
SETTINGSIMPORT	[filename]	This command enables you to restore or set system settings (or clone a new system) to match the configuration of a different *Quadra* unit. The command accepts the text file created using the **SETTINGSEXPORT** command. If the filename is not specified, the default filename"**export.txt**" is assumed. Use the following procedure to import settings from your PC. • Log in to *Quadra* using FTP from your PC. • Enter the user name "**rgb**" (lower case) and the password "**spectrum**." • Type the command "**put <filename>**" to place the file into *Quadra* memory. (**<filename>** is the name of the file created using the **SETTINGSEXPORT** command). • Type "quit" to log out of *Quadra*'s FTP server. • From the Telnet or serial port, issue the command **SETTINGSIMPORT <filename>**. Note that if you use the default filename "**export.txt**" you do not need to specify the filename. See also: **SETTINGSEXPORT**.
STATus	(none)	Returns details about the current graphics input signals that are applied to each *Quadra* graphics input.
SYStem**R**e**S**e**T**	(none)	Causes the *Quadra* system to reset.
Test**P**attern	<output # | ALL> [SNOW | RANDOM | DVI1 | RAMPS | GRID | HBARS | BARS | OFF]	Turns on the designated color bar test pattern for the specified output channel. Use the **OFF** argument to turn the test pattern off. Default: **OFF**
Update**F**irm**W**are	(none)	Loads new firmware into *Quadra*. This is a two step process. • The new firmware must be first be downloaded to *Quadra*. • Load the new firmware use the **UFW** command. • Refer to **Appendix D** for further information on updating firmware.
VERsion	(none)	Returns firmware, hardware, and bootcode revision information.

TIMING PARAMETERS

The table below lists timing parameters, values and ranges used for both the input and output timing functions. Advanced users can also use the table to assist with values listed in the "**Factory Timing List**."

For example, if you type **INT** <input #> to query the system's **Input Timing** values, you will get a string of values (<hfp> <hs> <hbp> <hact> <vfp> <vs> <vbp> <vact>) that represent *Quadra*'s settings for that input. The table below will greatly assist in clarifying each value's meaning.

Note

Internally, *Quadra* maintains two separate lists of timing parameters — one for inputs and one for output timings. However, the parameter definitions and ranges are identical for both lists.

Table 4-16. Definitions and Ranges for Timing Parameters

Parameter	Definitions	Ranges	Comments
HFP	Horizontal front porch	0 to 640 pixels	The beginning of the horizontal blanking interval.
HS	Horizontal sync	16 to 640 pixels	The width of the horizontal synchronizing pulse
HBP	Horizontal back porch	0 to 640 pixels	The end of the horizontal blanking interval. The total horizontal blanking = HFP + HS + HBP.
HACT	Horizontal active	16 to 1920 pixels	The active picture interval (non-blanked portion of the image). The total pixel count per line = HACT + HFP + HS + HBP.
VFP	Vertical front porch	0 to 512 lines	The part of vertical blanking prior to the vertical sync.
VS	Vertical sync	2 to 32 lines	The width of the vertical sync period.
VBP	Vertical back porch	0 to 512 lines	The part of the vertical blanking signal following the vertical sync interval.
VACT	Vertical active	12 to 1440 lines	The number of active lines of picture.
VTOT	Total Vertical line count	NA	This parameter is measured by *Quadra*. Users may not define this value, but the sum of VFP + VS + VACT must equal VTOT.
HFREQ	Horizontal frequency in Hz	12.5 to 125 kHz	This parameter is measured by *Quadra*. This is a read only parameter.

Table 4-16. Definitions and Ranges for Timing Parameters(Continued)

Parameter	Definitions	Ranges	Comments
SYNC	Sync format	3, 4, or 5 wires	This command applies to analog RGB inputs only. In 3 wire sync systems the H & V sync signals are combined with the Green signal. In 4 wire sync systems the H&V sync signals are combined and transmitted on a dedicated wire. 5 wire systems the H & V signals are transmitted on separate dedicated wires.
HPOL	Horizontal sync polarity	1 or 0	The value “1” represents positive sync polarity and the value “0” represents negative sync polarity. Typically the horizontal and vertical sync have the same polarity. Note that three wire sync is always negative polarity.
VPOL	Vertical sync polarity	1 or 0	The value “1” represents positive sync polarity and the value “0” represents negative sync polarity. Note that three wire sync is always negative polarity.
IL	Interlaced/Noninterlaced	1 or 0	The value “1” represents interlaced scan and “0” represents non-interlaced (progressive) scan. Note that video signals are typically interlaced, and graphics signals are typically non-interlaced.

FACTORY TIMING LIST

The table below lists all of *Quadra*'s preset timings that can be used for Output or Input timing settings. User-defined settings can also be added to this list. These settings are used to match the system's output to that of your display device, or can be used to manually define input timing. In Chapter 2, refer to the "**System Timing**" section for instructions on using the list.

Columns are provided for the timing ID, plus all of the individual parameters such as frequency, sync, polarity, interlace and many more. Refer to the "**Timing Parameters**" section for a detailed explanation of each parameter.

Please note:

- Entries 1 - 44 are factory defined timing parameters.
- Entries 45 - 99 are reserved for future pre-defined parameters.
- Entries 100 - 160 are for user-defined timings.
- Because all parameters can be modified with the "**OutPutTiMing**" function, advanced users can "tweak" output settings and then store them in the first ten registers, using the "**OutPutTiMingSAVE**" function.
- Custom settings can also be named using the "**OutPutTiMingNAME**" function.
- If desired, print this list and keep a record of any user-defined settings that you configure.

Table 4-17. Factory Timing List

ID	TYPE	HFP	HS	HBP	HACT	HFRQ	VFP	VS	VBP	VACT	SYNC	HPOL	VPOL	IL
1	VESA 640 x 350 @ 85Hz	32	64	96	640	37.861	32	3	60	350	5	1	0	0
2	VESA 640 x 400 @ 85Hz	32	64	96	640	37.861	1	3	41	400	5	0	1	0
3	VESA 720 x 400 @ 85Hz	36	72	108	720	37.927	1	3	42	400	5	0	1	0
4	VESA 640 x 480 @ 60Hz	16	96	48	640	31.473	10	2	33	480	5	0	0	0
5	VESA 640 x 480 @ 72Hz	24	40	128	640	37.861	9	3	28	480	5	0	0	0
6	VESA 640 x 480 @ 75Hz	16	64	120	640	37.500	1	3	16	480	5	0	0	0
7	VESA 640 x 480 @ 85Hz	56	56	80	640	43.269	1	3	25	480	5	0	0	0
8	VESA 800 x 600 @ 56Hz	24	72	128	800	35.156	1	2	22	600	5	1	1	0
9	VESA 800 x 600 @ 60Hz	40	128	88	800	37.879	1	4	23	600	5	1	1	0
10	VESA 800 x 600 @ 72Hz	56	120	64	800	48.077	37	6	23	600	5	1	1	0
11	VESA 800 x 600 @ 75Hz	16	80	160	800	46.875	1	3	21	600	5	1	1	0
12	VESA 800 x 600 @ 85Hz	32	64	152	800	53.674	1	3	27	600	5	1	1	0
13	VESA 1024 x 768 @ 43 Hz	8	176	56	1024	35.601	0	4	20	768	5	1	1	1
14	VESA 1024 x 768 @ 60Hz	24	136	160	1024	48.363	3	6	29	768	5	0	0	0
15	VESA 1024 x 768 @ 70Hz	24	136	144	1024	56.476	3	6	29	768	5	0	0	0
16	VESA 1024 x 768 @ 75Hz	16	96	176	1024	60.023	1	3	28	768	5	1	1	0
17	VESA 1024 x 768 @ 85Hz	48	96	208	1024	68.677	1	3	36	768	5	1	1	0
18	VESA 1152 x 864 @ 75Hz	64	128	256	1152	67.500	1	3	32	864	5	1	1	0

ID	TYPE	HFP	HS	HBP	HACT	HFRQ	VFP	VS	VBP	VACT	SYNC	HPOL	VPOL	IL
19	VESA 1280 x 960 @ 60Hz	96	112	312	1280	60.000	1	3	36	960	5	1	1	0
20	VESA 1280 x 960 @ 85Hz	64	160	224	1280	85.938	1	3	47	960	5	1	1	0
21	VESA 1280 x 1024 @ 60Hz	48	112	248	1280	63.981	1	3	38	1024	5	1	1	0
22	VESA 1280 x 1024 @ 75Hz	16	144	248	1280	79.976	1	3	38	1024	5	1	1	0
23	VESA 1600 x 1200 @ 60Hz	64	192	304	1600	75.000	1	3	46	1200	5	1	1	0
24	EIA-343-A 675 lines	16	56	64	832	20.253	2.5	2.5	20	312	4	1	1	1
25	EIA-343-A 729 lines	20	64	80	900	21.870	2.5	2.5	22	337	4	1	1	1
26	EIA-343-A 875 lines	26	96	118	1080	26.245	3	3	27	404	4	1	1	1
27	EIA-343-A 945 lines	36	112	140	1164	28.343	3	3	29	437	4	1	1	1
28	EIA-343-A 1023 lines	44	136	164	1260	30.692	4	4	30	473	4	1	1	1
29	720 x 480, 29.97i	16	61	61	720	15.734	3	3	14	242	3	0	0	1
30	720 x 576, 25i	12	66	66	720	15.625	2.5	2.5	20	287	3	0	0	1
31	960 x 480, 29.97i	23	69	92	960	15.734	3	3	14	242	3	0	0	1
32	960 x 576, 25i	23	69	100	960	15.625	2.5	2.5	20	287	3	0	0	1
33	1280 x 720, 24	70	40	260	1280	18.000	5	5	20	720	3	0	0	0
34	1280 x 720, 30	70	40	260	1280	22.500	5	5	20	720	3	0	0	0
35	1280 x 720, 60	70	40	260	1280	45.000	5	5	20	720	3	0	0	0
36	1920 x 1080, 24i	594	44	192	1920	27.000	2	5	15.5	540	3	0	0	1
37	1920 x 1080, 24p	594	44	192	1920	27.000	4	5	36	1080	3	0	0	0
38	1920 x 1080, 30i	44	44	192	1920	33.750	2	5	15.5	540	3	0	0	1
39	1920 x 1080, 30p	44	44	192	1920	33.750	4	5	36	1080	3	0	0	0
40	1920 x 1080, 60p	44	44	192	1920	67.500	4	5	36	1080	3	0	0	0
41	1920 x 1035, 30i	44	44	192	1920	33.750	5	5	35.5	517	3	0	0	1
42	1365 x 768, 60p	51	50	60	1365	47.280	4	4	12	768	5	1	1	0
43	1360 x 768, 60p	64	176	192	1360	47.712	3	6	18	768	5	1	1	0
44	1920 x 1200, 60p	48	32	80	1920	74.038	3	6	26	1200	5	1	0	0

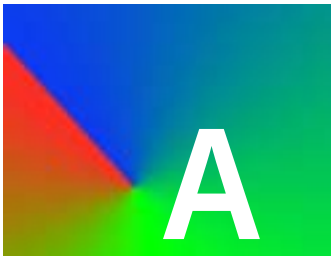


IMAGE CONCEPTS

IN THIS APPENDIX

This appendix discusses the basics of image size and position, beginning with the concepts of source and destination rectangles. In addition to the ability to size and position an input, users can assign different input sources and manipulate them in various creative ways. These and other topics are discussed in this chapter:

IMAGE RECTANGLES

The resolution of raster scanned images is defined by the number of pixels per line and the total number of lines per frame. For example, the XGA format is defined as having a resolution 1024 x 768 (1024 pixels per line and 768 active lines). This convention is applied to both the input and output of *Quadra*.

Within the *Quadra* architecture, the input signal is the source image. The portion of the input signal that will be used (and manipulated) is known as the **source** rectangle. This is an important point — it means that the source rectangle does not necessarily have the same dimensions as the input signal.

The **destination** rectangle defines the size and position of the image as displayed on the output.

Each type of rectangle is described below:

- A "**source rectangle**" selects a rectangular *portion* of a full size input image. Typically, the source rectangle contains the *entire* image, but it can also contain a cropped portion (or subset) of the entire picture.

  This portion fills the destination rectangle (as described below) on the display device. *Quadra* automatically changes an input's source rectangle as various zoom and pan functions are used to manipulate portions of the full-size image.

  Refer to the "**Source Rectangle**" section for more information.

- A "**destination rectangle**" specifies the output image's size and position on your display device — as defined by the source rectangle's parameters.

  Refer to the "**Destination Rectangle**" section for more information.

Source and destination rectangle settings are accomplished using the **WSR** (Window Source Rectangle) and **WDR** (Window Destination Rectangle) commands, as discussed in the following sections.

SOURCE RECTANGLE

The **source rectangle** for each input is defined in terms of the input image's pixel position in coordinate space. The image's top left corner is positioned using these coordinates, and the image's width and height are defined in the same way.

In the first example below, the full size source image is 640 pixels wide by 480 lines high.

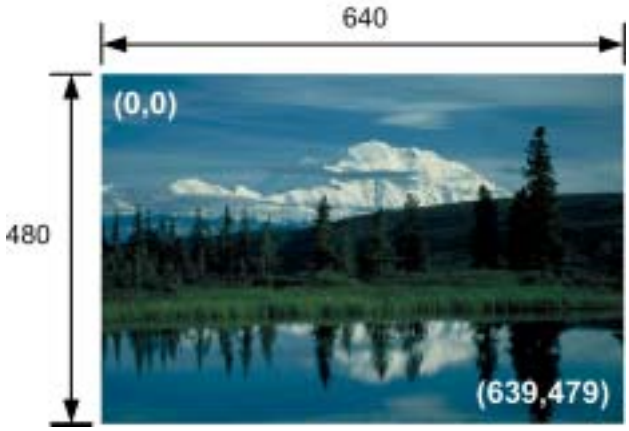


Figure A-1. Full Size Source Image

By convention, the upper left corner starts at pixel coordinate (**0**,**0**). The bottom right corner ends at coordinate (**639**,**479**). When using *Quadra*, the Window Source Rectangle (**WSR**) command uses the following convention to define an input's source rectangle:

```
x, y, width, height
```

The x and y parameters define the coordinates of the first pixel located at the top left of the image. The width and height parameters then define the size of the image. When using the command line interface, this **WSR** convention sets the source rectangle for the selected input.

Thus, to define (and use) the full size picture from **Figure A-1** as the output, the WSR would be defined as:

```
0 0 640 480
```

In the second example below, a *portion* of the full size source image has been defined.

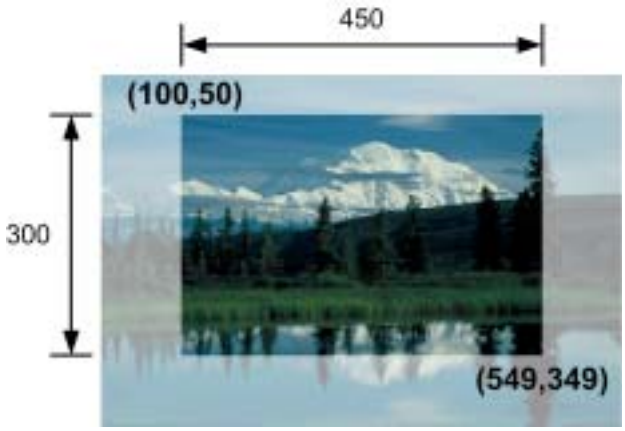


Figure A-2. Portion of Full Size Image

The “cropped” image is 450 pixels wide by 300 lines high. The upper left corner starts at pixel coordinate (**100**,**50**). The bottom right corner ends at coordinate (**549**,**349**).

Thus, to define (and use) the “cropped” size picture from **Figure A-2** as your source, the WSR would be defined as:

```
100 50 450 300
```

DESTINATION RECTANGLE

Each input's **destination rectangle** is defined in terms of the **display device's** screen space coordinates, rather than the input picture's coordinates. Each destination rectangle represents the source rectangle *mapped* to a specific size and position on the display.

In the example below, the display monitor is 1280 x 1024. The full size source rectangle from **Figure A-1** is mapped to a destination rectangle, starting at coordinates (**300**,**500**), with a horizontal width of 600 pixels and a vertical height of 250 lines.

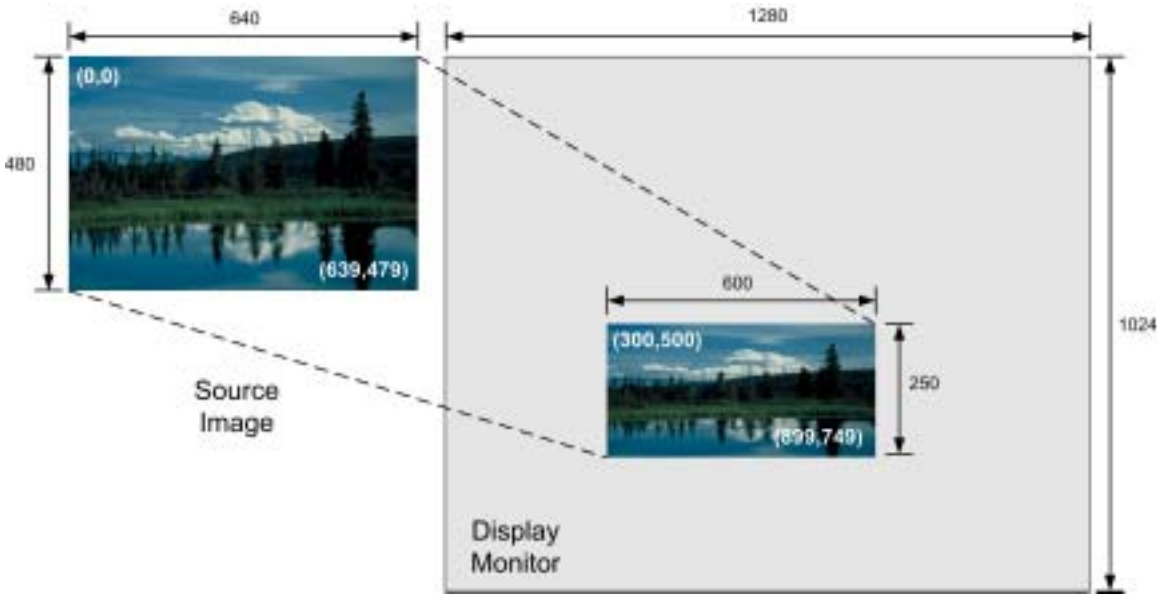


Figure A-3. Full Size Source mapped to Destination

The Window Destination Rectangle (**WDR**) command defines the size and position of the destination rectangle for the image displayed on the output channel.

Thus, to map the full size picture from **Figure A-1** (**WSR 0 0 639**, **479**) to a destination rectangle, the **WDR** would be defined as:

```
300 500 600 250
```

Note that in this example the original image size (the source) is 640 x 480 pixels but the size of the destination is 600 x 250. The resulting image (destination image) is smaller than the original and also has a different aspect ratio. Also the image is no longer located at the top left (origin) of the output display, but is moved more towards the center.

In the next example, the “cropped” image from **Figure A-2** is mapped to a new destination space on the display device.

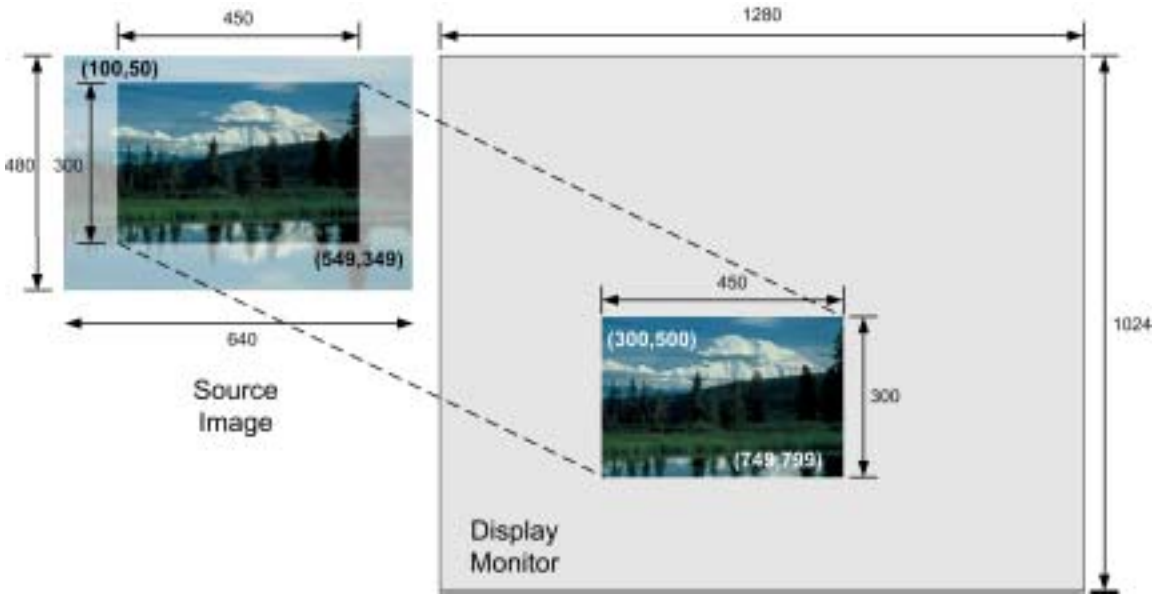


Figure A-4. Cropped Source mapped to Destination

In this case, the **WDR** value would be defined as:

```
300 500 450 300
```

Using WDR, you can take a portion of the source image and (without resizing it) can place it anywhere on the display device. By changing the destination size parameters (**450**,**300** in the above example), to 1280 x 1024, we could expand this cropped image to fill the display device. In this case, the **WDR** value would be defined as:

```
0 0 1280 1024
```

Note This action is effectively zooming into a section of the source image.

ASPECT RATIO

As you learned in the previous sections, the **source rectangle** parameter selects any desired rectangular portion of an input image. This image can then be displayed (mapped) in a **destination rectangle** — in an identical or different configuration of size and position. Please note:

- The destination rectangle can be set to any shape and any size on the output monitor — up to the full size of the output display screen.

- The size and shape of the source rectangle are *independent* of the destination rectangle's size and shape.

Suppose that you have defined an input's source and destination rectangles so that a 320 x 240 portion of a video source image is mapped into a 640 x 480 rectangle. Here, the destination rectangle is larger than the source rectangle, but it has the *same shape* and the same width-to-height aspect ratio (4:3). Thus, the original input image is enlarged (scaled) equally, in both dimensions.

Varying the destination rectangle's size but preserving its aspect ratio makes the displayed image larger or smaller. As long as its proportions correspond to those of the source rectangle, the output image resembles the input image.

If you *independently* vary the shape of either the source or destination rectangle, so that their aspect ratios are no longer the same, the displayed picture will appear stretched or squeezed as compared to the original image.

POSITIONING AND CLIPPING

An image can be sized and positioned anywhere on the output display. If the destination rectangle is defined so that a portion is off the screen, that portion of is "clipped" — until it is moved back into view.

Two examples of "image clipping" are illustrated below. In the first example, the full size source rectangle (640 x 480) is mapped to a destination rectangle, starting at (**900**,**100**). The right-hand portion of the source image is clipped.

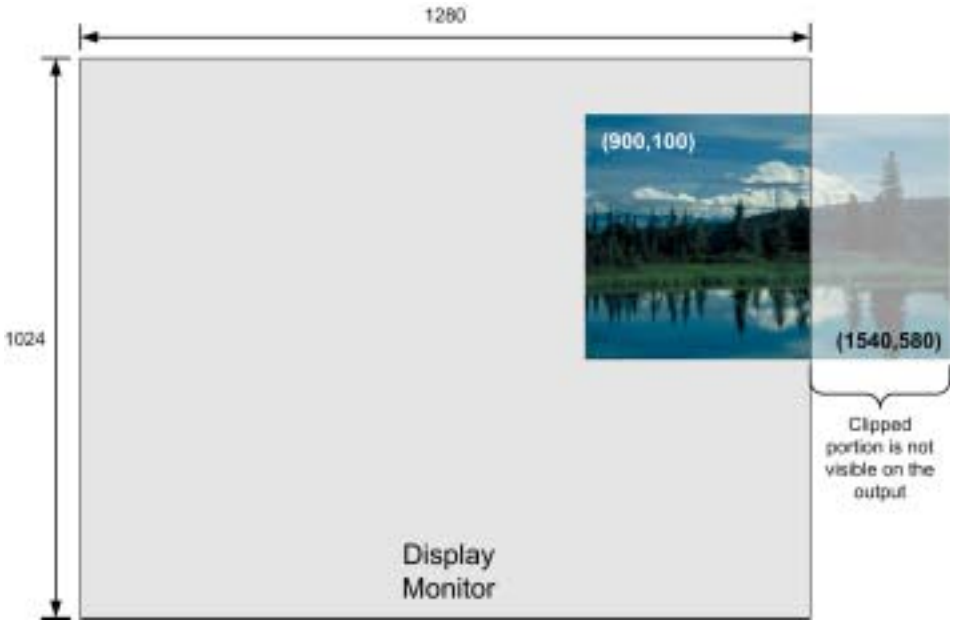


Figure A-5. Clipped Image, Screen Right

In the second example, the same source rectangle is mapped to a destination rectangle starting at (**-200**,**200**). By specifying screen coordinates with negative values, the left and top edges of the source image can be clipped.

Figure A-6. Clipped Image, Screen Left

COMMUNICATIONS SETUP

B

IN THIS APPENDIX

This appendix provides detailed information about specific communications setup procedures that are referenced in Chapter 2, "**Installation and Setup**." The following topics are discussed:

- **Launching a Hyperterminal Window**
- **IP Address Setup**

LAUNCHING A HYPERTERMINAL WINDOW

Use the following steps to launch a Hyperterminal window on your PC:

1. On your PC, click **Start > Programs > Accessories > Communications > Hyperterminal**.

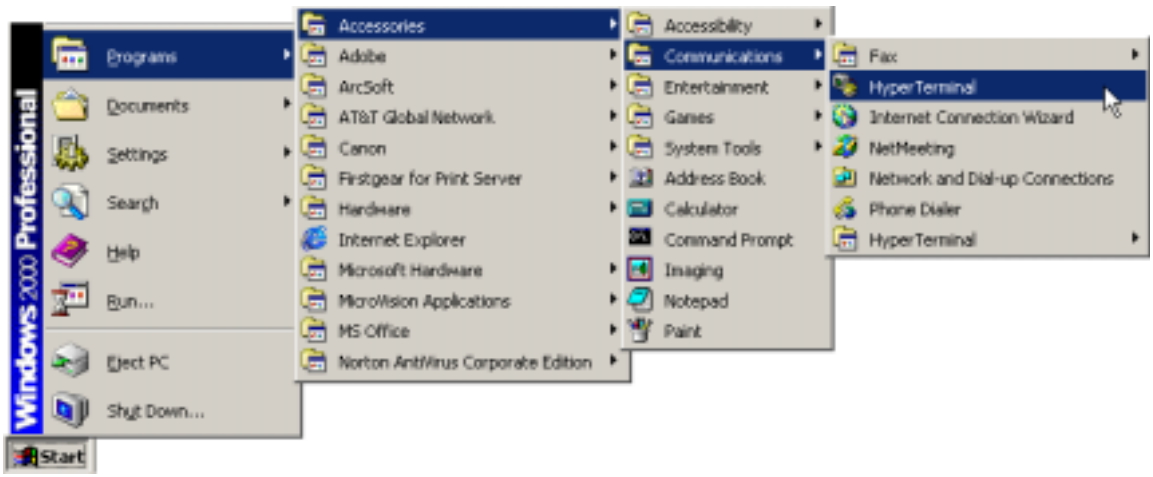


Figure B-1. Hyperterminal Path

This action displays the **Connection Description Dialog**, a sample of which is shown below.

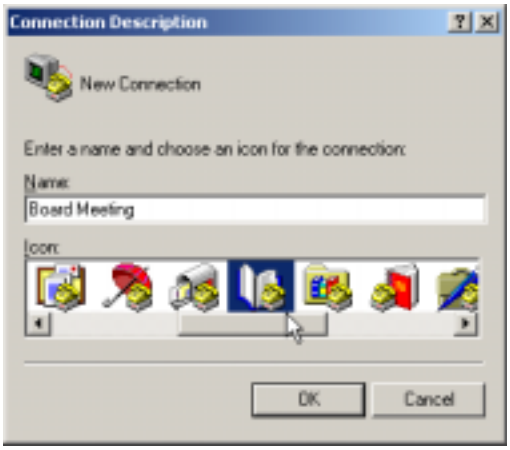


Figure B-2. Connection Description Dialog (Sample)

2. In the dialog:
   - ~ Enter a name
   - ~ Choose an icon
   - ~ Click **OK** to display the **Connect To Dialog**.

Figure B-3. Connect To Dialog (Sample)

3. In the **Connect To Dialog**, ignore the **Country**, **Area Code** and **Phone Number** fields. In the **Connect Using** field, select your PC's COM port to which the serial cable from *Quadra* is connected.

4. Click **OK** to display the **COM Properties Dialog**.

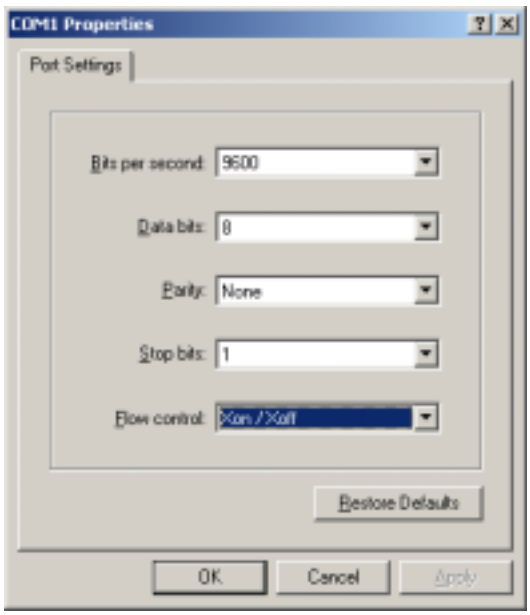


Figure B-4. COM Properties Dialog (Sample)

5. Configure your PC to match *Quadra*'s pre-configured factory settings, as follows:
   - ~ Bits per second (baud): **9600**
   - ~ Data bits: **8**
   - ~ Parity: **None**
   - ~ Stop bits: **1**
   - ~ Flow control: **XOn / XOff**

   Quadra can be configured to operate at baud rates from 9600 baud to 115 kbaud. In Chapter 4, refer to the "**Serial Port Commands**" section for details about changing baud rates.
6. Click **OK** to display the Hyperterminal window.
7. In Chapter 2, please continue with **step 5** in the "RS-232 Serial Control Setup" section.

IP ADDRESS SETUP

The following topics are discussed in this section:

- **Introduction to IP Addresses**
- **IP Address Setup via Serial Port**
- **IP Address Setup via Ethernet**

INTRODUCTION TO IP ADDRESSES

When connecting systems via Ethernet, the setup of communications parameters is automatic. However, because this is a network connection, a unique address (known as the **IP address**) is required.

For proper operation, *Quadra* requires a fixed IP address (also known as a "**static**" IP address). At the factory, *Quadra* is programmed with a default IP address (**192.168.1.200**), but this address must be changed if you want to use your *Quadra* on a network.

Important Consult your network administrator to obtain a valid IP address before commencing the network setup procedure.

▲ **Recommendation**: If you want to use *Quadra* on a Local Area Network (LAN), change the unit's IP address before putting it on the network. This can be accomplished in one of two ways:

~ Use the serial port to change the unit's IP address. Refer to the "**IP Address Setup via Serial Port**" section below.

~ Connect *Quadra* directly to a PC using *Quadra*'s Ethernet port. Refer to the "**IP Address Setup via Ethernet**" section for details.

IP ADDRESS SETUP VIA SERIAL PORT

Use the following steps to change *Quadra*'s IP address using the serial port:

1. Connect *Quadra* as outlined in the "**RS-232 Serial Control Setup**" section in Chapter 2.
2. In the Hyperterminal window, type:

   ```
   IPADDR
   ```

   ... and press **Enter**.

   Quadra responds with the current IP address. Make a note of the address before proceeding with the next step.
3. Type **IPADDR** followed by a space, and the new IP address (as provided to you by your network administrator).

▲ **Example**: If the new IP address is **192.168.100.15**, type:

```
IPADDR 192.168.100.15
```

... and press **Enter**.

4. *Quadra* responds with the following message:

   ```
   The system must be restarted for your changes to
   take effect. Do you want to restart the system
   (y/n)?
   ```

   ~ Press "**y**" to restart *Quadra* and use the newly assigned IP address.

   ~ Press "**n**" to retain the current IP address, and discard the new address.

5. Confirm the new setting by typing the command **IPADDR**. If *Quadra* has accepted the command, it responds with the new IP address that you just entered.

Once you have set the IP address, you can connect your PC to *Quadra* using Ethernet. In Chapter 2, refer to the "**Ethernet Control Setup**" section for instructions.

IP ADDRESS SETUP VIA ETHERNET

Quadra's IP address can be set directly via Ethernet, using a Telnet session that enables you to remotely log into a computer. This procedure is not required if you have already set the IP address using the method described above, in the "**IP Address Setup via Serial Port**" section.

Use the following procedure to set up the IP address with a Telnet session:

1. Use an Ethernet crossover cable to connect directly between the *Quadra*'s Ethernet port the network port of your PC.

Note

For this procedure, the *direct* connection method is recommended over the network method. This avoids potential conflicts between *Quadra*'s default IP address and your network.

2. Open a web browser window on your PC. **Internet Explorer**® is recommended.
3. Highlight the default **URL** (Uniform Resource Locator) in the browser's address line and press **Delete**.
4. In the browser's address line, type:

   ```
   telnet://<ipaddress> 8000
   ```

   where <**ipaddress**> represents *Quadra*'s current IP address.

▲ **Example**: If you have not changed *Quadra*'s default IP address, it should be set to:

```
192.168.1.200
```

Using the default IP address shown above, in your browser's address line, type:

```
telnet://192.168.1.200 8000
```

... and press **Enter**.

At this point, the Telnet window starts and *Quadra* responds with the product name and copyright notice as shown in the sample below.

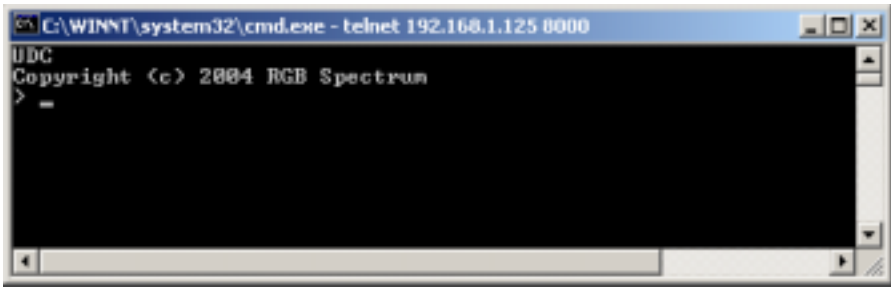


Figure B-5. *Quadra* **Login (Sample)**

5. To obtain a complete list of IP address settings, and to confirm the connection, in the Telnet window type:

   ```
   ID
   ```

   ... and press **Enter**. *Quadra* responds with a variety of product details including the IP settings.

6. To change the current IP address, type **IPADDR** followed by *Quadra*'s new IP Address (as provided by your network administrator).

▲ **Example**: If the new IP address is **192.168.100.15**, type:

```
IPADDR 192.168.100.15
```

... and press **Enter**

Quadra responds with the following message:

```
The system must be restarted for your changes to
take effect.

Do you want to restart the system (y/n)?
```

Type "**y**" to accept the new address, or "**n**" to retain the current address.

Important

When you change the IP address from the Ethernet port, the Telnet connection (and communication) will be lost. This behavior is to be expected. Simply restart the Telnet session using the new IP address.

7. If you pressed "**y**" in the step above, *Quadra* restarts and the Telnet connection is lost. Repeat steps 2 through 4 to establish a new Telnet session — except in step 4, type the new IP address.

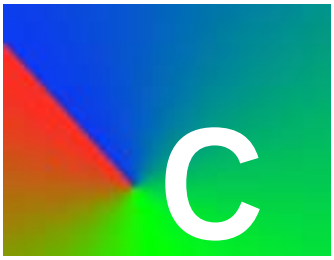
8. Confirm the new setting by typing the command **IPADDR** and pressing **Enter**. If the *Quadra* has accepted the command, it will respond with the new IP address.

This completes the procedure for setting up the IP address via Ethernet. You can now control *Quadra* directly by issuing ASCII commands from the Telnet

Window. Refer to Chapter 4, "**Command Line Interface**" for a complete command list.

Note

To close a Telnet session, type **EXIT** or use the keystroke sequence "**Control + D**."



CONNECTOR TYPES

IN THIS APPENDIX

This appendix provides detailed information about *Quadra*'s signal and control connectors.

CONNECTOR SUMMARY

The table below summarizes the types of connectors used in the *Quadra* chassis:

Table C-1. *Quadra* **Connector Types**

Connector	Physical Type	Gender
Composite Video Connector	BNC	Female
S-Video Connector	4-pin mini-DIN	Female
High Resolution Analog Connector	15-pin HD D-Sub	Female
DVI-I Connector	DVI-I	Female
RS-232 Connector	9-pin D-Sub	Female
Ethernet Connector	8-pin RJ-45	Female

COMPOSITE VIDEO CONNECTOR

Quadra's composite video inputs use the industry standard 75 Ω BNC connector.

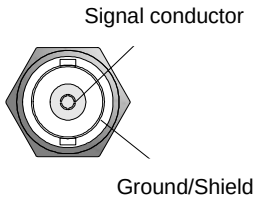


Figure C-1. BNC connector (viewed from rear of chassis)

The BNC connector is designed for use with coaxial cables. Coaxial cables are well suited for the transmission of high frequency signals over moderate distances. Please note:

- Coaxial cable is commonly available with a characteristic impedance of either 50 or 75 Ω.
- 75 Ω cables and connectors are used exclusively for Video signals.
- For best signal quality, it is important to use a high-quality 75 Ω coaxial cable.
- The use of 50 Ω cables will cause a signal mismatch, and this may result in visible artifacts on video images.

Ready-made cables are available commercially, or they can be easily customized on site for your particular requirements.

S-VIDEO CONNECTOR

S-Video signals are generally of higher quality than analog composite video signals. Composite video signals combine the black and white (monochrome) signals together with color information on a single coaxial cable. S-Video signals, however, use two signal wires to keep the luminance (black and white) and chrominance (color information) signals separated.

CONNECTOR TYPE AND PINOUTS

Quadra uses the standard 4-pin mini-DIN connector allowing the use of standard, commercially available cables. The pinout for the standard S-Video connector is shown in the figure below:

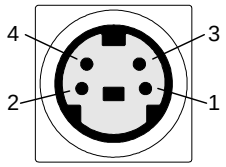


Figure C-2. S-Video connector (viewed from rear of chassis)

The 4-pin mini-DIN connector has the following signals:

Table C-2. S-Video Connector Pinouts

Pin	Signal	Description
1	Y (Luminance) Ground	Y shield
2	C (Chrominance) Ground	C shield
3	Y (Luminance) Signal	Y signal
4	C (Chrominance) Signal	C signal
Shield	Chassis ground	Ground

S-VIDEO CABLE LENGTH

S-Video cables tend to have higher loss than the standard coaxial cables (that are used for composite video). Therefore, for best results, cable lengths should be kept to a minimum. S-Video cables are available commercially.

HIGH RESOLUTION ANALOG CONNECTOR

Analog graphics signals are connected to *Quadra* using a standard 15-pin D-type connector. In graphics applications, the signals are typically transmitted as separate **Red** (R), **Green** (G) and **Blue** (B) signals. Sometimes, television signals are transmitted in component form, but they typically use a different signal format — using brightness (Y) and color difference signals (U,V). *Quadra* accepts either type of signal from the high resolution analog input connector.

CONNECTOR TYPE AND PINOUTS

The high resolution (RGB / YUV) inputs are connected using a sub miniature 15-pin D-type (HD-15), as shown below. This connector is often referred to as a VGA or VESA connector, and it supports the VGA, SVGA, XGA, SXGA and UXGA signals.

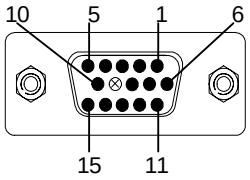


Figure C-3. RGB Analog Connector (viewed from rear of chassis)

The table below lists signals for the 15-pin D-type (HD-15) connector, including the pinout for the RGB analog input and the correct connections for YUV inputs. Note that the analog input supports both RGB and YUV signals.

Table C-3. RGB Analog Video Connector Pinouts

Pin	Signal	Description
1	R	Red signal (alternatively used for V)
2	G	Green signal (alternatively used for Y)
3	B	Blue signal (alternatively used for U)
4	NC	ID2 (not used)
5	NC	GND TEST
6	Ground	Red ground
7	Ground	Green ground
8	Ground	Blue ground
9	no pin (key)	
10	Chassis ground	Ground
11	NC	ID 0 (not used)
12	NC	ID1 (not used)

Table C-3. RGB Analog Video Connector Pinouts(Continued)

Pin	Signal	Description
13	CS/HS	Composite Sync or Horizontal Sync
14	VS	Vertical Sync
15	NC	ID3 (not used)

HIGH RESOLUTION ANALOG CABLE LENGTH

High quality RGB or YUV signals have very high signal bandwidths. Cable lengths should be kept as short as possible, as longer cable lengths attenuate the signal more severely at higher bandwidths.

DVI-I CONNECTOR

The DVI connector is used to interconnect graphics devices. This is a standard connector based on the work of the Digital Display Working Group (DDWG).

CONNECTOR TYPE AND PINOUTS

The connector used in *Quadra* is a 29-pin DVI-I connector, supporting both analog and digital signals. The DVI-I connector (as shown below) is used for *Quadra*'s four standard DVI output channels and for each channel's optional digital DVI input.

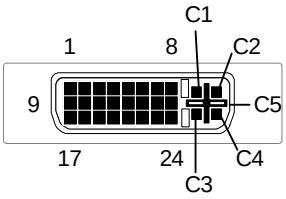


Figure C-4. DVI-I Digital/Analog Connector (viewed from rear of chassis

The 29-pin DVI-I connector has the following signals:

Table C-4. DVI-I Connector Pinouts

Pin	Signal	Description
1	TMDS Data 2-	
2	TMDS Data 2+	
3	TMDS Data 2/4 shield	
4	NC	Defined for Dual Link only
5	NC	Defined for Dual Link only
6	DDC Clock	
7	DDC Data	
8	Analog Vertical Sync	Horizontal sync is on pin C4
9	TMDS Data 1-	
10	TMDS Data 1+	
11	TMDS Data 1/3 shield	
12	NC	Defined for Dual Link only
13	NC	Defined for Dual Link only
14	+5V Power	5 V fused @ 300mA.
15	Ground	
16	Hot Plug detect	

Table C-4. DVI-I Connector Pinouts(Continued)

Pin	Signal	Description
17	TMDS Data 0-	
18	TMDS Data 0+	
19	TMDS Data 0/5 shield	
20	NC	Defined for Dual Link only
21	NC	Defined for Dual Link only
22	TMDS Clock shield	
23	TMDS Clock+	
24	TMDS Clock-	
C1	Analog Red	Red signal
C2	Analog Green	Green signal
C3	Analog Blue	Blue signal
C4	Analog H sync	Analog Horizontal Sync signal
C5	Analog Ground	Common analog ground (R,G,B, sync)

ANALOG AND DIGITAL INPUT CABLES

Please note the following points regarding input cables:

- **Analog Inputs** — *Quadra* provides a standard 15-pin sub-miniature D connector for the analog input signals (see the "**High Resolution Analog Connector**" section for details).
- **Digital Inputs** — Digital graphics inputs can be connected using the DVI input option. Standard DVI cables are available commercially for various lengths to allow connection to DVI graphics outputs.

DVI OUTPUT CABLES

Quadra's DVI output connectors support both digital and analog outputs. Purpose-built cables are available commercially to provide connections for digital or analog interfaces.

Quadra is provided with a DVI 15-pin adapter for use with analog devices. Alternatively, an analog-only output cable can be purchased that provides a "break out" capability to separate RGB connectors or sub-miniature 15-pin D connector.

ETHERNET CONNECTOR

CONNECTOR TYPE AND PINOUTS

The Ethernet connector is a standard RJ-45 type connector.

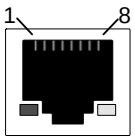


Figure C-5. Ethernet connector (viewed from rear of chassis)

The 8-pin RJ-45 Ethernet connector has the following signals:.

Table C-5. Ethernet Connector Pinouts

Pin	Signal	Wire Color
1	TX Data +	White/Orange
2	TX Data -	Orange
3	RX Data+	White/Green
4		Blue
5		White/Blue
6	RX Data-	Green
7		White/Brown
8		Brown

STANDARD ETHERNET CABLES

Standard Ethernet cables are available commercially in different lengths. The standard cable is wired pin for pin (straight through), meaning that pin 1 of the connector at one cable end is wired to pin 1 of the connector at the opposite end. This type of cable is used to connect *Quadra* directly to the network, typically using an Ethernet hub or switch. To connect directly from a PC to the *Quadra*, a crossover cable must be used (see the following section for details).

CROSSOVER CABLES

To connect directly from a PC or laptop to *Quadra* without connecting to the network, an Ethernet “crossover” cable must be used. Crossover cables are available commercially. In a crossover cable, one end of the cable is wired using the pin assignments shown in **Table C-5**. At the other end, the TX and RX connections are exchanged (crossed over).

Ethernet uses balanced differential signals on twisted pairs of conductors. Standard pairs are shown in **Table C-5**. For each pair, one wire has a solid color. The other wire is white with a colored stripe matching the first wire’s color (e.g., Orange and White/Orange).

RS-232 CONNECTOR

The RS-232 port is configured according to the Electronic Industries Association Standard RS-232-C published in August 1969. The *Quadra* can be explicitly controlled with ASCII Command Set instructions sent via the RS-232 serial port from either a computer or an ASCII terminal. In Chapter 4, refer to the "**Command Set List**" section for details on all commands.

CONNECTOR TYPE AND PINOUTS

Physically, the RS-232 port is a 9-pin D-Sub female connector. The pins for the RS-232 connector are numbered from top to bottom, right to left. Looking at the connector, pin #1 is located in the upper right corner, and pin #9 is in the lower left corner.

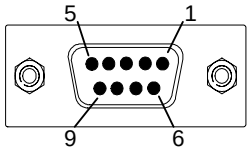


Figure C-6. 9-pin D-Sub RS-232 Female Connector

The 9-pin D-Sub connector has the following signals:

Table C-6. RS-232 Serial Connector Pinouts

Pin	Circuit	Description
1	CD	Carrier Detect
2	TD	Transmit Data
3	RD	Received Data
4		(not connected)
5	AB	Signal Ground (common return)
6	DSR	Data Set Ready
7	CTS	Clear to Send
8	RTS	Request to Send
9		(not connected)

NULL MODEM

You may need to connect *Quadra*'s serial port to a computer configured as Data Communications Equipment (DCE). This is accomplished using a null modem. The net effect of a null modem is to reverse the **Transmitted Data** and **Received Data** connections within the cable. Also, the **Request to Send** (RTS) and **Clear to Send** (CTS) connections are reversed. This may be done by using a special "null modem" cable, or by inserting a small "null modem" box or cable in series with a regular "straight through" cable.

FIRMWARE UPGRADES AND TROUBLESHOOTING

IN THIS APPENDIX

The following topics are discussed in this appendix:

- **Firmware Upgrades**
- **System Troubleshooting**
- **How to Contact RGB Spectrum**

FIRMWARE UPGRADES

From time to time, new features or improvements are made to *Quadra*'s firmware. Your system's firmware can be updated at your facility, as soon as you have a copy of the new firmware.

The following topics are discussed in this section:

- **Firmware Upgrade Prerequisites**
- **Downloading Firmware**
- **Transferring Firmware**
- **Installing New Firmware**

FIRMWARE UPGRADE PREREQUISITES

Quadra's firmware version can be field-upgraded **only** via the Ethernet port. This means that your PC will need to be connected to *Quadra* directly or through a network connection.

Note

> The firmware upgrade process for *Quadra* is different from prior RGB products. Make sure that you follow these instructions exactly!

The following two items are required for this procedure:

- Computer configured for a 10/100BASE-T network connection.
- Current firmware update file and release notes.

Important

> Do not upgrade without these two items. If you want to upgrade using a direct connection from a PC to *Quadra* (not using a network), use a crossover cable. In Appendix C, refer to the "**CrossOver Cables**" section for details.

DOWNLOADING FIRMWARE

Use the following steps to download firmware from the RGB website:

1. Before you begin, use the "**VER**" command to identify your current firmware version. Make a note of the version number.
2. On your PC, launch a standard web browser and log on to the RGB website: **http://www.rgb.com**
3. Click the "**Support**" link to display the main support page.
4. Scroll down to the "**Product Support**" section and click the link for your specific product. The product's support page will be displayed.
5. In the "**Firmware**" section, click the "**Release Notes**" link. Review the document for a summary of the changes in this version, and note the firmware version number. Compare this version number to your current firmware version to determine if an upgrade is required.

6. If an upgrade is required for your product, click the "**Firmware**" link and download the firmware to a folder on your PC.
7. Make a note of this folder's location, for use in a subsequent step.
8. Continue with the "**Transferring Firmware**" procedure.

TRANSFERRING FIRMWARE

Firmware can be transferred from your PC to *Quadra* using either of two methods:

- **Transferring New Firmware (Browser Method)**
- **Transferring New Firmware (FTP Method)**

Both methods use standard file transfer protocol (**FTP**) — one via a web browser and the other in a command window.

TRANSFERRING NEW FIRMWARE (BROWSER METHOD)

Use the following steps to transfer firmware to *Quadra* via web browser:

1. Connect *Quadra* to the PC using the Ethernet port — either directly or via a network. Remember that a crossover cable is required for direct connections.
2. On your PC, open up the folder into which you downloaded the firmware. Keep this folder open on your desktop.
3. Launch your web browser. In the browser's **Address Bar**, type:

   `ftp://<ip address>`

   ... and press **Enter**.

   Note that <**`ip address`**> represents the IP address of the *Quadra* that you want to upgrade.

   ▲ **Example:** If the IP address of your *Quadra* is **192.168.1.200**, type:

   `ftp://192.168.1.200`
4. At the login screen, type "**`rgb`**" for the user name and "**`spectrum`**" for the password. Be sure to use lower case characters.
5. Cut and paste the upgrade file "**`fwop_x.xx.tar`**" into the browser page (where **`x.xx`** represents the version number).
6. As an alternate transfer method, simply drag the file from the open folder (on your PC's desktop) onto the browser page.
7. Verify that the file is now shown in the browser page.
8. Please continue with the "**Installing New Firmware**" procedure.

TRANSFERRING NEW FIRMWARE (FTP METHOD)

Using FTP in a standard command window, this procedure is an alternate way of transferring the firmware file from your PC to *Quadra*.

1. Connect *Quadra* to the PC using the Ethernet port — either directly or via a network. Remember that a crossover cable is required for direct connections.
2. On your PC, open up the folder into which you downloaded the firmware. The filename will be "**`fwop_x.xx.tar`**," where **`x.xxx`** represents the version number. Keep this folder open on your desktop for reference.
3. To open a command window, click **Start > Run**. In the **Run Dialog**, type "**`CMD`**" and press **Enter**.
4. In the command window, type "**`FTP`**" and press **Enter**. This action opens an FTP terminal.
5. At the FTP prompt, type:

   `open <ipaddress>`

   ... and press **Enter**.

   Note that <**`ip address`**> represents the IP address of the *Quadra* that you want to upgrade.

   Once the connection is successful, a message appears in the command window indicating that you are connected to *Quadra*'s IP address.
6. At the prompt, enter the user name "**`rgb`**" (lower case) and press **Enter**. At the next prompt, type the password "**`spectrum`**" and press **Enter**. The message "**`230 User rgb logged in`**" appears, as shown in the sample below:

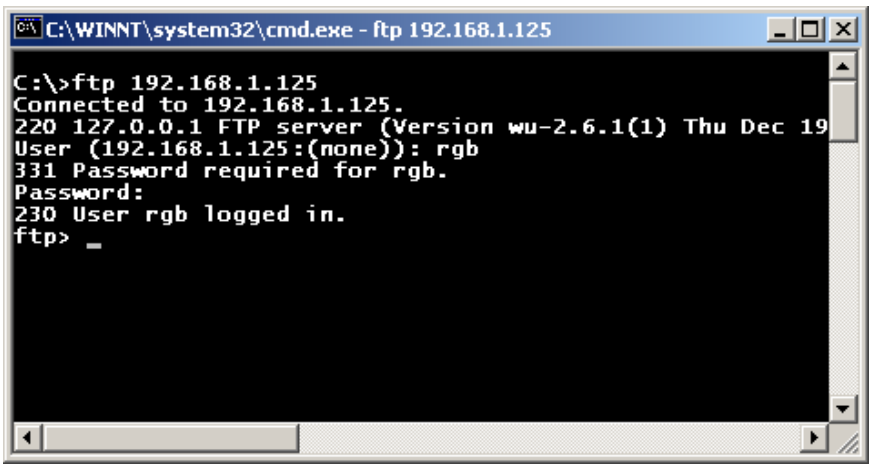


Figure D-1. Windows FTP login screen, *Quadra* connection

7. At the prompt, type the command "**`bin`**" and press **Enter**.

8. Type the command "**`put fwop_x.xx.tar`**" (where **`x.xx`** represents the version number) and press **Enter**. This action copies the firmware to *Quadra*.
9. Type the command "**`quit`**" and press **Enter** to close the FTP session.
10. Please continue with the "**Installing New Firmware**" procedure.

INSTALLING NEW FIRMWARE

For this procedure, you will need to use a serial or Telnet terminal to finalize the upgrade process.

Use the following step to install new firmware into *Quadra*.

1. Connect your PC to *Quadra* via the serial port. In Chapter 2, refer to the "**RS-232 Serial Control Setup**" section for instructions.
2. Using the command line interface, type "**`ufw`**" and press **Enter**.
3. *Quadra* will ask for confirmation that you wish to proceed. Press "**y**" to continue or "**n**" to halt the process.

   After typing "**y**," *Quadra* loads the files. When the loading process has completed, the following message appears:

   ```
   You may now restart the system
   ```

4. On *Quadra*'s front panel, press the **Reset Button**, or cycle the power by switching the **Power Switch** off and on again. In Chapter 2, refer to **Figure 2-1** for the location of the **Reset Button**.
5. Wait a few seconds for the system to start, then verify that the new firmware is loaded by typing the command "**`ver`**" from the command line in your serial terminal emulator.

Your *Quadra* is now ready for operation, with the new firmware installed.

SYSTEM TROUBLESHOOTING

Problems with *Quadra* operation may result from incorrect system connections and settings. In the event of difficulty or anomalous results, first check the following basic items:

- Cable connections
- The video format associated with each input
- The timing selected for the display device attached to a particular channel
- Any system options currently in effect
- Use the command line interface to query the current settings of the parameter in question to determine *Quadra*'s current values.

Some of these items are discussed in detail in the "**Troubleshooting Guide**" section below.

Important *Quadra*'s hardware should only be modified or repaired by RGB Spectrum's technicians.

TROUBLESHOOTING GUIDE

Use the table below to troubleshoot the *Quadra*. If problems persist, refer to the "**How to Contact RGB Spectrum**" section for technical support instructions.

Table D-1. Troubleshooting Guide

Symptom	Recommendations
No power or lights	Check that the *Quadra* is plugged in and powered on.
No signal or a poor signal on the display.	• Check that all cables are connected correctly. • Turn on a test pattern using the "**TestPattern**" function, and determine the quality of the output image on the selected channel. • Ensure that the appropriate set of output parameters are loaded from the "**Factory Timing List**" for your current display and channel.
No inputs are visible	• Ensure that your output channels are enabled using the "**WINdowENable**" function. • Ensure that the channel in which you are working has not been positioned off screen. Use the **WSR** and **WDR** query commands to determine where the image is positioned.

Table D-1. Troubleshooting Guide(Continued)

Symptom	Recommendations
Images have the wrong aspect ratio (e.g., are stretched) or are not positioned correctly	• Try selecting a different output from the "**Factory Timing List**" to better match your display. • Determine that there is not a mismatch between your output and the selected monitor display (e.g., 4:3 output and 16:9 display monitor). • Use the "**WindowSourceRectangle**" (**WSR**) and "**WindowDestinationRectangle**" (**WDR**) functions to check or modify the image's aspect ratio.
Blank image (the output is black)	• Ensure that the source is properly connected to the system, powered on and generating a signal. • Ensure that the correct input type is selected using the "**INputSouRCe**" command.
Frozen image	If an image is frozen after system start-up, turn freeze off using the "**FReeZe**" command.
Missing imagery	• Check the "**WindowSourceRectangle**" (**WSR**) value to ensure the entire image is being processed. • Check **WSR** and "**WindowDestinationRectangle**" (**WDR**) to ensure that the source and destination rectangles are delivering the entire video image.
Poor quality video	• Check the video source for proper operation. • Check that cables are in good condition and connected correctly. • Ensure that video sources are not double terminated. Double termination can occur when one video source is split into two using a "**T**" connector instead of a distribution amplifier. • If you are using a VCR, check the quality of the tape. • Adjust the brightness using the "**BRIghtness**" command. • Adjust contrast using the "**CONTrast**" command. • Adjust saturation as required using the "**SATuration**" command. • Adjust the hue as required using the "**HUE**" command.
No color on the S-Video input	• Check that the "**SATuration**" setting is set to normal. Adjust as necessary. • Check that the S-video cable is connected correctly. • Check that S-Video has been selected as the source using the "**INputSouRCe**" command. If you select Composite2 when you have an S-Video signal connected to this port, the input will be displayed as a black and white (luminance only) signal.
Aspect Ratio on a video input is incorrect.	Check the status of the "**VideoAspectRatio**" command. For a 4:3 aspect ratio signal, this should be set to normal.

Table D-1. Troubleshooting Guide(Continued)

Symptom	Recommendations
No text on a terminal	• To see your own typed entries, enable the echo mode when using an ASCII terminal (or terminal emulation program) to control the system from the RS-232 port. • Use the "**ECHO**" command to enable or disable the echo mode. • When using an application program running on a computer to control *Quadra* over the RS-232 port, you may need to disable the echo mode. • Check baud rate and protocol settings. • Check that cables are in good condition and connected correctly.
Unreliable control of the *Quadra* from the RS232 port.	• See the recommendation immediately above. You may need to disable "**ECHO**." • Check that the "**BAUDrate**" for the *Quadra* and your console device are set to the same speed.
Unable to connect to the *Quadra* over the network.	• Check that the *Quadra* is connected to the network using a standard Ethernet cable. • Check that you are using the correct IP address. • If you are unable to connect and are sure that IP address is correct, check the Subnet mask and make sure that it is suited to your network configuration. • If you believe the IP address and Subnet mask are correct but you still cannot connect, check that this is not a duplicate IP address. Use the IP "ping" command from the Windows® command window, and see if there is a response. If there is a response, turn off *Quadra* and ping the IP address again. If there is still a response, a duplicate address exists.
Unable to connect to *Quadra* directly from a PC (peer to peer connection).	• Check that *Quadra* is connected to the PC using an Ethernet crossover cable. A suitable cable is the Belkin Part # A3X126-07. • Check that you are using the correct IP address. • If you are unable to connect and are sure that the IP address is correct, check the IP settings of your PC. Many PCs are set to work with a DHCP server which is not present when connecting directly to *Quadra*. • If you believe that *Quadra*'s IP address is correct and your PC has a valid IP address, but you still cannot connect, check that this is not a duplicate IP address. Use the IP "ping" command from the Windows command window, and see if there is a response. If there is a response, turn off *Quadra* and ping the IP address again. If there is still a response, your PC has been set with the same address as the *Quadra*.

HOW TO CONTACT RGB SPECTRUM

RGB Spectrum can be reached via phone, fax, mail and e-mail as listed below:

- **RGB Spectrum**
  950 Marina Village Parkway
  Alameda, CA 94501
- Phone: (510) 814-7000
- Fax: (510) 814-7026
- E-Mail (technical support): support@rgb.com
- E-Mail (sales and product information): sales@rgb.com
- Website: **http://www.rgb.com**

TECHNICAL SPECIFICATIONS

IN THIS APPENDIX

This appendix is divided into two sections:

- The "**General Specifications**" section provides *Quadra*'s technical, functional and performance specifications.
- The "**Parameter Storage**" section provides details of the types of data that are used in *Quadra*, and how they may be stored and retrieved.

Note The specifications listed in this appendix apply to a fully configured *Quadra* system.

GENERAL SPECIFICATIONS

The following section provides detailed tables of functional and performance specifications:

- **System Characteristics**
- **Digital Input Specifications**
- **Analog Input specifications**
- **Composite Video Input Specifications**
- **S-Video Input Specifications**
- **Graphic Output Specifications**
- **Image Control Specifications**
- **Control Specifications**
- **Power and Physical Specifications**

SYSTEM CHARACTERISTICS

The table below lists *Quadra* system characteristics:

Table E-1. System Characteristics

Parameter	Specification
Number of channels	Four channels, each with up to four user-selectable types of inputs.
Input types	The user may select between the following types for each input channel: • RGB / YPbPr component (HDTV) • Composite video • S-Video • DVI (optional)
# of outputs per channel	Each output connector is dedicated to a specific input channel. Each output connector supports 1 x analog or 1 x DVI output
Horizontal scan rate	12 kHz to 125 kHz (non interlaced)
Frame rate (Refresh rate)	Up to 200 Hz
Resolution	640 x 350 to 1600 x 1200 pixels

DIGITAL INPUT SPECIFICATIONS

The table below lists high resolution graphics digital input specifications:

Table E-2. Optional Digital Input Specifications

Parameter	Specification
Type	DVI - Single link
Maximum bandwidth	1.65 Gbps
Connector type	DVI-I Integrated digital/analog connector, MicroCross (Molex #74320)

ANALOG INPUT SPECIFICATIONS

The table below lists high resolution graphics analog input specifications:

Table E-3. Analog Input Specifications

Parameter	Specification
Type	Analog RGB/YP_bP_r
Analog video	RGB/YP_bP_r, interlaced or non-interlaced
Video level	Nominal 0.7V p-p (1.0V p-p)
Input impedance	75 ohms
Sample rate	Up to 162 Msamples/sec
Sync type	Available sync types: • 3 wire (Sync On Green) • 4 wire (Separate Composite Sync) • 5 wire (Separate H and V Sync)
Sync level	0.3V p-p (3 wire), 5V p-p (4 and 5 wire sync)
Analog HD video	
Video level	1V p-p (sync and video)
Sync	Tri-level
Sync level	0.6V p-p
Connector type	Sub miniature D connector type HD-15

COMPOSITE VIDEO INPUT SPECIFICATIONS

The table below lists composite video input specifications:

Table E-4. Composite Video Input Specifications

Parameter	Specification
Format	Composite, NTSC RS-170A or PAL CCIR 624
Number	Up to eight composite channels (see S-Video specifications for details).
Input sampling	All inputs sampled as 3:2 pixels (CCIR 601 sampling)
Video levels	0.5 to 2.0 V peak-to-peak; 1.0 V peak-to-peak nominal
Sync levels	0.3 to 0.6 V peak-to-peak
Connector type	BNC female

S-VIDEO INPUT SPECIFICATIONS

The table below lists S-Video input specifications:

Table E-5. S-Video Input Specifications

Parameter	Specification
Format	S-Video (NTSC RS-170A or PAL CCIR 624)
Number	Up to four S-Video channels, or the user may use the S-Video channel for four additional composite video inputs (Composite2).
Input sampling	All inputs sampled as 3:2 pixels (CCIR 601 sampling)
Video levels	0.5 to 2.0 V peak-to-peak; 1.0 V peak-to-peak nominal
Sync levels	0.3 to 0.6 V peak-to-peak
Connector type	4-pin mini-DIN

GRAPHIC OUTPUT SPECIFICATIONS

The table below lists high resolution graphic output specifications:

Table E-6. Graphic Output Specifications

Parameter	Specification
Analog	
Analog output level	Nominal 0.7V. pk to pk (excluding sync)
Output impedance	75 ohms
Sample rate	Up to 162 Msample/sec
Sync type	Available sync types: • 3 wire (sync on green), • 4 wire (separate composite sync) • 5 wire (separate H and V sync)
Sync level	0.3V p-p (3wire), 5V p-p max (4 and 5 wire)
DVI	
Max bandwidth	DVI single link (1.65Gbps)
Connector type	DVI-I MicroCross Integrated Digital / Analog Connector

IMAGE CONTROL SPECIFICATIONS

The table below lists image control specifications:

Table E-7. Image Control Specifications

Parameter	Specification
Size	The size of each image can be scaled from thumbnail up to full screen.
Position	Images may be positioned to an accuracy of one pixel horizontally and one line vertically. An image can be moved to any region of the display space, and if a portion is positioned off the screen, it is clipped.
Zoom, Pan	Maximum Zoom range 32:1. Fully Pan within a zoomed image.
Other Functions	Video source select, freeze frame, brightness and contrast, hue and saturation.

CONTROL SPECIFICATIONS

The table below lists *Quadra* control specifications:

Table E-8. Control Specifications

Parameter	Specification
Control Protocol	*Quadra* control is accomplished by use of the *Quadra* ASCII based command set. This command set may be used with any of the control ports listed below.
Ethernet	10/100 BASE-T ethernet port. Supports control of the full set of *Quadra* commands over a network connection using a Telnet server/client architecture.
RS-232 Port	*Quadra* commands can be sent through the RS-232 port to control the system. • The RS-232 port transfers commands using the asynchronous serial protocol at 115200, 57600, 38400, 19200 or 9600 baud. • The port is configured as DCE and can handle full duplex transfer. • Support for hardware and software handshaking is provided. • The *Quadra* RS-232 port connector type is a 9-pin sub miniature D connector.

POWER AND PHYSICAL SPECIFICATIONS

The table below lists *Quadra* power and physical specifications:

Table E-9. Power and Physical Specifications

Parameter	Specification
Input Voltage	90-264 VAC
Frequency	47Hz - 400 Hz
Power Consumption	65VA
Size	19" W x 15.3" x D x 1.75"H
Weight	14 pounds (6.4 kg)

PARAMETER STORAGE

This section describes the categories of settings that are stored in *Quadra*, and how these settings are stored and retrieved.

The following topics are discussed:

- **Factory Defaults**
- **System Configuration**
- **User Configuration**
- **Settings Export/Import**
- **System State Values**
- **Timing Presets**

FACTORY DEFAULTS

Quadra is shipped from the factory with pre-configured settings (parameters) known as **Factory Defaults**. As soon as you begin to use the system, these default settings will be replaced with your new settings.

New settings are automatically stored by *Quadra* in non-volatile memory. In this manner, when you next turn on the unit, it will operate with the same settings as the last time the unit was used (even if you had turned off the power).

If you want to return to the factory settings, use the **RestoreFactoryDefaults** command.

Note

Restoring factory defaults will not affect the IP address settings of your *Quadra*.

SYSTEM CONFIGURATION

When you turn on *Quadra* power, the unit automatically loads settings for all controls from non-volatile memory. This enables *Quadra* to function in the same way as before power was turned off. This information, known as the "**System Configuration**," is stored automatically in non-volatile memory.

USER CONFIGURATION

Quadra enables you to save your own set of default settings. This allows you to override the current settings and set up the unit in a way that you have previously defined. The **SAVECONFIGguration** command provides a manual way to save the current system settings into non-volatile memory. The settings may then be loaded at any time using the **RECALLCONFIGuration** command. This is equivalent to using the **RestoreFactoryDefaults** command, but using your own set of default values instead of the factory defined defaults.

SETTINGS EXPORT/IMPORT

In addition to storing settings internally in non-volatile memory, *Quadra* provides the ability to store settings to an external device such as a PC. The settings are stored in a text file that can be exported to (or imported from) the external device using the **SETTINGSEXPORT** and **SETTINGSIMPORT** commands. This file can be generated to contain all system settings, or a subset

of the settings as outlined below:

Tip

Recalling previously stored parameters will change the operation of your unit. Because there is no undo feature, we recommend that you have a backup copy of your preferred settings. The copy could be stored internally in *Quadra* using the **SAVECONFIGguration** command, or externally using the **SETTINGSEXPORT** feature.

Following are explanations of various "**SettingsExport**" options:

- **System** — using this option results in a text file that stores system parameters as outlined in the "**System State Values**" section later in this chapter.
- **Timing** — using this option results in a text file that stores the values for the output and all inputs as outlined in the "**Timing Presets**" section later in this chapter.
- **Window** — using this option results in a text file that stores the values for the Window preset settings.

These subsets can be created using optional arguments to the command. If the **SETTINGSEXPORT** command is not provided with an argument, the default state "**ALL**" causes the generated file to contain the complete set of parameters consisting of the **System**, **Timing** and **Window** settings.

SYSTEM STATE VALUES

There are several categories of system values (parameters) that are saved, as outlined below:

- **Input Timing Values** — The following timing values for each graphics input are saved:
  - ~ Timing preset name and number
  - ~ Horizontal front porch, sync width, back porch, and active area (in pixels)
  - ~ Vertical front porch, sync height, back porch, and active area (in lines)
  - ~ Sync format
  - ~ Horizontal and vertical sync polarities
  - ~ Interlace
  - ~ Autosync mode
- **Image controls (Graphics)** — The following parameters are stored for each graphics input:
  - ~ Input signal source
  - ~ ADC sample phase
  - ~ De-interlacer mode

  - ADC gain and offset values for Red, Green, and Blue channels
  - Brightness, Contrast, Hue, Saturation and Sharpness for each of three possible input sources (RGB, DVI, YUV)

- **Image controls (Video)** — The following parameters are stored for each video input:
  - Input signal source
  - Brightness, Contrast, Hue, Saturation, Filter settings, Aspect Ratio, and Over/Underscan mode for each of three possible input sources (Composite1, Composite2, S-Video)
- **Output channel** — The following parameters are stored for each *Quadra* output:
  - Gamma
  - Output sync source
  - Background pattern type
  - Background Red, Green, and Blue color values
- **Output timing values** — The following timing values are stored for each *Quadra* output:
  - Timing preset name and number
  - Horizontal front porch, sync width, back porch, and active area (in pixels)
  - Vertical front porch, sync height, back porch, and active area (in lines)
  - Horizontal and vertical frequencies
  - Sync format
  - Horizontal and vertical sync polarities
  - Scanning system (interlace/progressive)
  - Output reference mode
  - Aspect ratio
- **Image settings** — The following parameters are stored for each channel:
  - Enable
  - Source rectangle dimensions (X, Y, width, height)
  - Destination rectangle dimensions (X, Y, width, height)
- **Mapping** — The mapping of inputs is stored for each channel.

- **Configuration values** — The following configuration values are stored:
  - ~ X and Y repeat rates used in interactive image position and pan
  - ~ Scale step used in interactive image size and zoom
- **Serial port settings** — The following settings are stored for RS-232 control port:
  - ~ Baud rate
  - ~ Echo
  - ~ Handshaking

TIMING PRESETS

In addition to the factory supplied timing presets, users are allowed to save and recall up to 61 timing presets. Note that *Quadra* has a common timing list that can be applied to either input or output ports.

There are three ways to create a timing preset entry. The first two are listed immediately below. Note that they store a limited number of timing parameters as listed in the "**Timing Preset**" list below.

- **Output timing** — Timing presets may be created by saving output timing settings using the **OutPutTiMingSAVE** command.
- **Direct loading** — Timing presets may be created by directly loading them using the **TiMingLISTLOAD** command.

Timing presets contain the following parameters:

- Timing preset name
- Horizontal front porch, sync width, back porch, and active area (in pixels)
- Vertical front porch, sync height, back porch, and active area (in lines)
- Horizontal and vertical frequencies
- Sync format
- Horizontal and vertical sync polarities
- Interlace

Timing presets that were created by saving input timing with the **INputSAVE** command will contain all of the above settings — in addition to the following supplemental parameters:

- ADC sample phase
- De-interlacer mode
- ADC gain and offset values for Red, Green, and Blue channels
- Brightness, Contrast, Hue, Saturation, Filter settings, Aspect Ratio and Over/Underscan mode